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ABSTRACT

Four main purposes of a study of students learning three shorthand systems were to determine if first-year students achieved minimum shorthand goals, to compare dictation achievements of students learning different shorthand methods for the possible selection of one system over another for certain groups of students, to gain further insight into factors related to different types of shorthand achievement, and to determine students' attitudes about learning shorthand and if those attitudes changed as the year progressed. Related research was reviewed and pretest, shorthand attitude, and shorthand achievement data were collected from 1,317 beginning shorthand students in 20 area high schools teaching Gregg, Forkner, or Century 21 shorthand. Seventy-three percent of the students completed the work and tests showed that the majority of the time Forkner shorthand students achieved the highest accuracy and transcription rate scores. Most students agreed that shorthand was easy to learn, but Forkner and Century 21 students agreed more strongly with this statement. However, one year of shorthand was not considered sufficient for high school students to develop minimal shorthand skills regardless of the system since no student could produce a mailable letter at 80 words per minute dictation. Recommendations included offering Forkner shorthand to students for at least one year, additional counseling for low aptitude students, and spending classroom time to discuss career opportunities, as well as personal use applications, for persons with shorthand skill.
 (BL)

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FINAL REPORT

Evaluation of First-Year Shorthand Achievement

Conducted Using Grant Awarded by
the Department of Vocational and Technical Education
University of Minnesota

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JJL

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Chapter 1

INTRODUCTION

This chapter includes the statement of the problem of this research, the purpose of the study, and the specific questions to be answered. The need for the study is discussed together with the limitations of the study and definitions of terms used in this report.

Statement of the Problem

The main problems of this study were to collect pretest data on abilities considered to be related to shorthand achievement, measures of students' attitudes toward learning shorthand, and shorthand dictation achievement after one year of instruction for students learning three different shorthand systems and to compare pretest abilities, attitudes, and achievement among these systems. The three systems taught were Gregg (Gregg, Leslie, and Zoubek, 1971); Forkner (Forkner, Brown and Forkner, 1968), and Century 21 (Christensen and Bell, 1974) shorthand. A related problem was to determine the relationship between several pretest measures and three different types of shorthand achievement measures.

Purposes of the Study

There were four main purposes for collecting ability, attitude and achievement data for students learning three shorthand systems. First was to judge on a city-wide scale whether first-year shorthand achievement for the majority of students coincided with the minimum goals typically stated for the first-year course.

The second purpose was to compare dictation achievement for students learning different shorthand systems and to thereby make judgments about the possible merits of choosing one system rather than another for certain groups of students. The collection of pretest measures of ability was a means of identifying groups of students and of controlling for differences in ability when comparing achievement levels.

The collection of pretest measures was related to the third purpose of the study, that of gaining further insight into those factors related to different types of shorthand achievement. Knowledge of the relationships between pretest and achievement data could help counselors and teachers in guiding students in their selection of shorthand in high school. Teachers might also use knowledge of such relationships in planning instructional activities for students identified as high or low on these ability measures.

A fourth purpose of the study was to determine the attitudes students possessed about learning shorthand and to see if these attitudes differed among the three shorthand systems and if these attitudes changed as the school year progressed. Little is known about the reasons why students take shorthand even though in many instances it is assumed that they are seeking a vocational skill. Whether these goals are different when an alphabetical system is taught compared with a symbolic system is not known. Further, knowing students' perceptions about the ease or difficulty of a subject as well as their reasons for taking the course may permit teachers to respond better to these attitudes in their instructional activities.

Specific Questions to be Answered

The following were the specific questions to be answered by the collection and analysis of shorthand pretest, attitude, and achievement data:

1. Do students learning Gregg, Forkner and Century 21 shorthand differ on any of the following pretest measures:
 - a) Revised Byers' Shorthand Aptitude Test,
 - b) Thorndike 20-Word Vocabulary Test,
 - c) Spelling Test,
 - d) Cooperative English Test?
2. What levels of achievement are attained by students learning Gregg, Forkner and Century 21 shorthand at the middle and end of the school year on the following measures:
 - a) Percent of actual words transcribed correctly from dictation at three speed levels,
 - b) Percent of English errors contained in the words transcribed correctly from dictation at three speed levels,
 - c) Transcription rate attained when transcribing letters dictated at three speed levels?
3. What is the relationship between each of the pretest measures and the several shorthand dictation achievement measures?
4. Are there differences among the achievement levels for students learning three different shorthand systems under the following conditions:
 - a) no control over pretest measures?
 - b) control over pretest measures?
 - c) categorization of students as having high or low scores on pretest measures?
 - d) categorization of students as having transcribed their shorthand notes in either longhand or typewritten form with no control over pretest measures?
 - e) categorization of students as having transcribed their shorthand notes in either longhand or typewritten form with control over pretest measures?

- f) consideration of only those students transcribing in long-hand or only those students transcribing in typewritten form with no control over pretest measures?
 - g) consideration of only those students transcribing in long-hand or only those students transcribing in typewritten form with control over pretest measures?
5. Is the number of students who drop out of the shorthand classes before the end of the school year different for the three shorthand systems?
 6. Is the number of students transcribing in either longhand or typewritten form different for the three shorthand systems?
 7. Do students learning each of the three shorthand systems who drop out of shorthand before the end of the school year differ from nondropouts on any of the pretest measures?
 8. Do students learning Gregg and Forkner shorthand systems differ on either pretest or achievement measures when considering only those high schools offering both of these shorthand systems?
 9. Do the attitudes of students toward learning shorthand differ among the three systems taught prior to beginning instruction, midway through instruction, and at the end of one year of instruction?
 10. Do the attitudes of students learning a single shorthand system change from the beginning of the school year to the middle of the year and from the middle of the year to the end of the year?

Need for the Study

The need for the information made available in this study is related to those factors which have caused increased interest in the teaching of alternative shorthand systems. The teaching of shorthand systems different from Gregg shorthand, the system taught most widely in the United States, is being considered by more teachers for two major reasons: the less than satisfactory achievement levels attained after one year of instruction in shorthand, and the trend for fewer students to take two years of shorthand instruction in high school.

A common expectation for achievement levels at the end of one year of instruction in shorthand has been the recording of dictation at a minimum of 80 wpm for three or five minutes and the transcription of these notes with at least 95 percent accuracy (Tonne, Popham, Freeman, 1965, p. 185; and Douglas, Blanford, Anderson, 1973, p. 189). Current analysis of actual business dictation (Olinzock, 1976) has indicated, however, that the designation of a single dictation rate as necessary for vocational application of shorthand skill is not possible. Dictation rates in business vary widely.

If one rate were to be used as a standard for comparison with this 80 wpm recommendation, the average dictation rate might be used.

Olinzock reported that the average overall dictation speed on business letters was found to be 78 wpm. Olinzock used actual spoken words in tabulating this rate, however, rather than the shorthand "standard word" of 1.4 syllables. Since the overall syllabic intensity of the correspondence which Olinzock recorded was 1.65 syllables, 78 wpm would become 92 wpm in material marked using 1.4 syllables as the standard word. In other words, for business teachers to set 80 wpm as a minimum skill for vocational use of shorthand is probably an underestimate of the skill level actually required. Unfortunately, however, several studies substantiate the finding that most shorthand students do not achieve even this minimum after one year of instruction.

Frink's (1961) review of shorthand research from 1946 to 1957 showed that most students were capable of taking dictation at 60 wpm at the end of one year of instruction. She reported transcription rates on material dictated at 80 wpm to be 12 wpm. Further, at the end of one year of shorthand, only 11 to 20 percent of high school students were found to be capable of producing mailable transcripts from material dictated at 60 wpm.

In a similar review of shorthand research from 1957 to 1967 (Barr, 1970), the proportion of students attaining the 80 wpm standard was again disappointingly low. For example, Barr cites the study of 130 first-year students by Bellucci (1964) in which 18 percent of the students transcribed the 60 wpm three-minute dictation successfully (presumably with 95 percent accuracy or better), and 9 percent transcribed the 80 wpm three-minute dictation successfully. On the five-minute dictation tests, 14 percent of the students passed at 60 wpm and none passed at 80 wpm.

In 1969 Talbot collected achievement from 1,684 first-year students in Utah. Only 0.4 percent of the students achieved 95 percent accuracy or better on the 80 wpm three-minute dictation. The fact that the test material used in this study was marked for dictation using 1.5 rather than 1.4 syllables as a standard word (making the dictation rate closer to 86 wpm) does not change the finding that few students attained this skill level. An accuracy level of 90 percent was achieved on these tests by only 0.7 percent of the students.

Busch (1974) also administered three-minute dictation tests to high school students at the end of one year and used 95 percent accuracy as the passing score. He reported the following proportions of 551 students passing at each speed: at 80 wpm, 17 percent; at 70 wpm, 34 percent, and at 60 wpm, 50 percent. One year is apparently not sufficient time for most students to achieve the goal of recording dictation at 80 wpm. Many cannot master 70 wpm for three minutes with a 5 percent error allowance.

One potential weakness of most of these reports of achievement might be the manner in which the data were collected: a single dictation test given under perhaps unfamiliar conditions. Frequently the dictation was recorded on tape to maintain the consistency of the dictation. The strangeness of the testing conditions may have created a downward bias in achievement scores. The need exists to obtain achievement data in which students have more than one opportunity to demonstrate their dictation skill.

While the majority of high school students apparently do not attain vocational skill levels within one year, it is also apparent that many high

school students do not receive more than a year of instruction. National enrollments in shorthand during the 1960-61 school year were reported to be approximately 394,000 for the first-year course and approximately 154,000 for the second-year course (Tonne and Nanassy, 1970, p. 20). In 1970-71, the first-year enrollments were 514,157, and the second-year enrollments were 128,114 (Gertler and Barker, 1973, p. 16). While in both decades the difference between the first- and second-year enrollments was quite marked, second-year enrollments have been decreasing as a proportion of the first-year enrollments. In 1960-61, second-year shorthand enrollments were 39 percent of the first year; in 1970-71, they were 25 percent. Further, projections for total shorthand enrollments in 1980 are less than the total in 1960 (Nanassy, Malsbary, Tonne, 1977, p. 37).

These decreases in enrollments, particularly in the second-year course, are probably due to several factors. In a 1970 survey in Illinois, Crank, Crank and Hanrahan (1971-72) showed that of 65 high schools, approximately 25 percent did not offer a second year of shorthand. Further, approximately 27 percent of the students in the beginning course were seniors and would have only one year of instruction in high school whether a second year was available or not. Over 53 percent of the juniors enrolled in the beginning course did not plan to take a second year.

Clearly if most students will be receiving only one year of instruction in shorthand and achievement results with Gregg shorthand in this amount of time have not been satisfactory, impetus has existed for examining other shorthand systems. Several alphabetic systems and one newly introduced symbolic system have been among the alternatives. In the Twin Cities Metropolitan Area this interest in alternative shorthand systems has resulted in at least 16 high schools teaching Forkner shorthand (an alphabetic system) and at least two high schools teaching Century 21 shorthand (a symbolic system).

As Forkner and DeYoung (1976) have pointed out, little rigorous research has been available comparing one shorthand system with another. That which does exist will be reviewed in the next section. The need exists in the Twin Cities area to determine whether teaching a shorthand system other than Gregg shorthand has resulted in achievement both different from that attained with Gregg shorthand and closer to the minimum skill levels desired for the majority of students at the end of one year of instruction.

As soon as schools begin to teach a new shorthand system, many become schools in which two shorthand systems are taught, Gregg shorthand plus another. In the Twin Cities area nine of the sixteen schools known to be offering Forkner shorthand were also offering Gregg shorthand. When students may choose between two systems, additional questions become important to teachers in these schools. Do students having different goals or abilities choose one system rather than another? Do teachers or other students possess the attitude that one system is easier or more difficult than the other? Because of the choice available, are there differences in shorthand achievement between students learning the two systems? Research has not been conducted previously on a large enough scale to address these questions.

Limitations of the Study

This study was carried out with the following limitations:

1. The classes teaching Gregg, Forkner, and Century 21 shorthand were not randomly selected. Rather, all schools known to be teaching Forkner and Century 21 shorthand in the Twin Cities Metropolitan Area were asked to participate in the testing. Enough classes teaching Gregg shorthand were asked to make the number of students learning Gregg shorthand comparable to the number learning Forkner shorthand.
2. No control was exercised over the teaching methodology used by the teachers in any of the classes. A total of 33 different teachers were involved in teaching shorthand in the 20 high schools.
3. Because of the procedures required by federal and university regulations to protect human subjects in research, a decision was made not to obtain the prior grade point averages of the participating students. The procedures required to obtain these data from students' records were different and more rigorous than those approved for the collection of pretest and shorthand achievement data. It was anticipated that the willingness of participants to allow the use of pretest and achievement data might be jeopardized if grade point averages were also requested.
4. The shorthand dictation achievement tests administered at the middle of the school year were not administered at the same point in time in each school. These tests could not be administered until all of the theory of a shorthand system had been presented. For this reason scores were affected not only by the shorthand system taught, but also by the amount of instructional time elapsed before covering all the theory of the shorthand system.

Definitions of Terms

The following terms are defined as they were used in this study:

Percent of Accuracy: The percent of actual words in the body of a dictated letter that were transcribed correctly without regard to spelling and typewriting errors.

Percent of English Error: The number of errors in spelling, punctuation, capitalization, hyphenation, and number expression calculated as a percent of the actual number of words transcribed correctly.

Transcription Rate: The actual number of correct words transcribed per minute in either longhand or typewritten form.

Shorthand Standard Word: In order to pace the speed of dictation, a standard word of 1.4 syllables was used.

Syllabic Intensity: The total number of syllables in the body of a letter divided by the total number of actual words in the letter.

Common Words: The first 200 most frequently used words on the Perry word list.

Chapter 2

REVIEW OF RELATED RESEARCH

This review of related research is limited to studies completed since 1960 in which achievement in first-year high school shorthand was compared for at least two shorthand systems. Discussed first are those studies in which Gregg shorthand achievement was compared with achievement in Forkner shorthand. Next studies which reported achievement comparisons for Gregg shorthand and Century 21 shorthand are presented. Finally studies which compared Gregg shorthand with other alphabetic systems are briefly discussed.

Comparisons of Gregg and Forkner Shorthand

The earliest major study comparing achievement in Gregg and Forkner shorthand was completed by Smith in 1966. Smith's sample included 18 high schools, 24 teachers, and 234 students learning Forkner shorthand and 302 students learning Gregg Diamond Jubilee shorthand. From among these students, 180 students were selected such that for each system 30 students of below-average, average, and above-average ability as measured by grade point averages were included for the purpose of comparing shorthand achievement.

At the end of one year of instruction three sets of dictation tests were administered at five-week intervals from February to May. Each set of tests consisted of three-minute dictation at speeds of 50, 60, 70, 80, 90 and 100 wpm. The syllabic intensity of the letters was controlled at 1.4, and 65 percent of the words in the letters were from among the first 200 most frequently used words on the Silverthorn word list. On a single test day two letters were dictated, and 30 minutes were allowed for their transcription. All students transcribed all of the dictation, and the letters were scored on the basis of the number of standard words transcribed correctly. Spelling, punctuation and paragraphing were not considered in judging errors.

The following are the major conclusions which Smith made on the basis of his findings:

1. The achievement of the Forkner students was significantly higher than the achievement of the Gregg students.
2. The Forkner group achieved higher than the Gregg group at each speed level, in each of the three grade point levels, and in each of the three sets of dictation.
3. In addition to achieving higher than their corresponding levels in the Gregg group, the Forkner average achievers achieved higher than the Gregg above-average achievers, and the Forkner below-average achievers achieved higher than the Gregg average achievers.
4. At the dictation speed of 80 wpm, the average percents of accuracy of the above-average, average, and below-average Forkner groups were 89 percent, 82 percent and 40 percent respectively. For these same

three groups on the 80 wpm dictation for Gregg shorthand the percents of accuracy were 69 percent, 53 percent and 40 percent. Neither the Forkner nor the Gregg shorthand students after a one-year course could meet the requirement for initial employment as shorthand writers if 95 percent accuracy at 80 wpm was used as the minimum speed requirement.

Hadfield (1975) compared achievement of students learning Gregg, Forkner and Stenoscrypt shorthand in nine high schools across the United States, three for each system. A total of 239 students began the shorthand course in these schools and participated in taking the Survey of Language Achievement test which was used as a pretest measure of basic language ability. The dictation at the end of the school year was one of the letter sets developed by Smith (1966) and consisted of three-minute dictation at 60, 80 and 100 wpm. The dictation was recorded on tape, and students were permitted 12 minutes to transcribe the 60 wpm letter, 16 minutes to transcribe the 80 wpm letter, and 20 minutes to transcribe the 100 wpm letter. This limitation on time may have reduced achievement scores for students who did not have time to finish the transcription. In scoring the transcripts, spelling, punctuation, paragraphing and extra words were not considered in judging errors. The score for each student was the number of standard words transcribed correctly, as was also used by Smith. Data were available for 129 students who qualified as having complete data sets and being beginning shorthand students, 55 from the Forkner classes, 43 from the Gregg classes, and 31 from the Stenoscrypt classes.

The following were the major conclusions of Hadfield's study:

1. Forkner shorthand allowed the students to develop a higher skill than Gregg and Stenoscrypt ABC shorthand.
2. Forkner shorthand was better suited for students of any ability level--below-average, average, and above-average--than Gregg and Stenoscrypt ABC shorthand.
3. The basic language ability of students had a direct relationship with achievement in all shorthand systems.
4. For a one-year shorthand course, the Forkner shorthand system was superior to Gregg and Stenoscrypt ABC shorthand.
5. If the ability to take dictation at 80 wpm followed by transcribing the shorthand notes within 95 percent accuracy of the dictated material is considered the necessary requirement for initial employment, then none of the three shorthand systems can provide this ability for most of their students in one year of classroom instruction. This conclusion was based on the finding that the average percents of accuracy on the 80 wpm dictation were 76 percent for Forkner, 60 percent for Gregg, and 64 percent for Stenoscrypt shorthand.

A third study compared achievement in Gregg, Forkner and Century 21 shorthand in five high schools in Florida (Oross, 1976). Data were collected from 60 students learning Forkner shorthand, 23 students learning Gregg shorthand, and 10 students learning Century 21 shorthand. In May of the school year two-minute dictation tests recorded on tape at the

speeds of 40, 50 and 60 wpm were transcribed by all of the students. Only transcripts with 95 percent accuracy or better were accepted.

Forkner was judged to be the superior system on the basis of 26 percent of these students passing the 80 wpm test compared with 10 percent of the Gregg students passing and 5 percent of the Century 21 students passing. No control existed over differences in students' abilities or the teaching procedures used in the classes. No statistical tests were performed to verify that the differences observed were not chance occurrences.

Comparisons of Gregg and Century 21 Shorthand

The Florida study (Oross, 1976) just cited found Century 21 shorthand to result in lower achievement levels than Gregg shorthand, a finding different from two other more formal comparisons of these two systems. Cowley (1976) compared shorthand achievement for Gregg and Century 21 shorthand in 17 high schools in Utah including 194 Century 21 students and 215 Gregg students. At the end of one year of instruction these students received four three-minute dictation tests at 60, 70, 80 and 90 wpm from taped dictation. The dictation copy was controlled to have 50 percent of the total words from among the first 100 most frequently used words on the Silverthorn-Perry word list. The syllabic intensity of the letters was maintained at 1.5 at each speed.

All students were to transcribe all four of the dictation speeds and were permitted one class period in which to complete each letter. Scores reported were the proportion of students passing each dictation speed with 90 and 95 percent accuracy levels. Errors included the omission of words, the insertion of extra words, and the substitution of incorrect words for the words dictated. Format and spelling errors were disregarded.

At 80 wpm, six percent of the total Gregg students and 10 percent of the Century 21 students passed with 95 percent accuracy. When a 90 percent accuracy standard was applied, 11 percent of the Gregg students and 18 percent of the Century 21 students passed the 80 wpm dictation. The following were the major conclusions which Cowley drew from her findings:

1. Less than one-half of the first-year shorthand students tested were capable of writing new-matter dictation for three minutes at 60 wpm with a transcript accuracy level of 95 percent, despite the general tendency by business educators nationwide to regard this level of competency as an appropriate goal for first-year shorthand students.
2. Less than 10 percent of the students attained the generally accepted minimum employment skill of 80 wpm with 95 percent transcript accuracy after one year of shorthand instruction.
3. In general Century 21 students achieved higher levels of writing competency than Gregg students in first-year high school shorthand.

Stoddard (1976) reports similar findings in favor of Century 21 shorthand over Gregg shorthand. In this study the teaching of either system was randomly assigned to 10 shorthand classes in four Utah high schools. A total of 68 Gregg and 85 Century 21 students completed the one-year program. At the end of the school year four three-minute dictation tests were administered at the dictation speeds of 60, 70, 80 and 90 wpm. Perhaps these were the same ones developed by Cowley, since both studies were completed at the same institution.

At the 80 wpm rate, 24 percent of the Gregg students and 36 percent of the Century 21 students achieved 95 percent accuracy or better. Because of significantly higher student retention rates, higher word-list test scores, and higher proportions of students passing at each dictation speed for Century 21 shorthand, Stoddard concluded that these findings "support conclusively and positively the expression of confidence that has been given to Century 21 shorthand during the years of its development." (Stoddard, 1976, p. 6)

Comparisons of Gregg and Other Alphabetic Shorthand Systems

The Hadfield study (1976) already discussed included Stenoscript ABC shorthand in the comparisons of achievement with Gregg and Forkner shorthand. The findings showed Stenoscript shorthand in some instances to result in higher achievement and in some instances lower achievement than Gregg shorthand. In all instances both Gregg and Stenoscript students had lower achievement scores than did Forkner students. For example, on the 80 wpm dictation test, the average percent of accuracy for Forkner shorthand was 76 percent compared with 64 percent for Stenoscript and 60 percent for Gregg shorthand. At 100 wpm, however, the average percent of accuracy was 44 percent for Gregg shorthand, 43 percent for Stenoscript shorthand, and 55 percent for Forkner shorthand. Hadfield concluded that Forkner was the preferred system and that Gregg and Stenoscript shorthand were generally comparable in the achievement levels attained.

These findings were contrary to those of Horlacher (1969) even though the same dictation material was used to measure achievement. As did Hadfield, Horlacher used the three-minute dictation tests developed by Smith (1966). A total of 29 Stenoscript students and 46 Gregg students in one high school were included in the study. The Turse Shorthand Aptitude test and other mental ability test scores from the students' school records were used to control for ability differences.

Horlacher found the Stenoscript students to achieve significantly higher accuracy scores than Gregg students on dictation tests at 60, 70, 80 and 90 wpm, but no differences in achievement resulted at 50 and 100 wpm. He concluded that Stenoscript shorthand was superior to Gregg shorthand for a one-year shorthand course. At the 80 wpm speed, however, the average percents of accuracy were 73 percent for Stenoscript shorthand and 64 percent for Gregg shorthand. Most students, therefore, were not reaching the 95 percent accuracy standard at this speed.

Gregg shorthand (Simplified) was compared with Carter Briefhand by Harper (1964) using seven California classes of 191 Carter Briefhand students and 200 Gregg shorthand students. From these classes 140 students

were selected, 70 for each system. The Turse Shorthand Test, the California Test of Mental Maturity, the Iowa Test of Educational Development, and total grade point averages were used to equate the samples.

A total of twelve three-minute dictation tests were administered at the speed levels of 50, 60, 70, 80, 90 and 100 wpm at middle and at the end of the school year. Two letters were dictated at each speed, and the total error scores on each letter at the same speed were averaged to yield one score. The following summarize the major conclusions from Harper's data:

1. The difference between Gregg I (90 days) and Briefhand was significant at 50, 60, and 70 wpm in favor of Briefhand.
2. The difference between Gregg I and Briefhand was not significant at 80, 90 and 100 wpm.
3. The difference between Gregg II (180 days) and Briefhand was not significant at 50 wpm.
4. The difference between Gregg II and Briefhand was significant at 60, 70, 80, 90 and 100 wpm in favor of Gregg II.
5. For a one-semester course in shorthand, Carter Briefhand would be more valuable; two semesters of Gregg shorthand resulted in a higher level of achievement than Briefhand.

Summary of Related Research

The seven studies reviewed above vary in the size of the samples used (75 in the Horlacher study to 536 in the Smith study) and in the control exercised over ability differences (none in the Cross and Cowley studies to several verbal ability and shorthand aptitude measures in the Horlacher and Harper reports). All of the studies used two- or three-minute dictation tests (frequently the same materials), but student scores were reported differently: sometimes as the average percent of accuracy attained by the groups of students, and sometimes as the proportion of students in a group achieving a minimum accuracy standard. While these are major differences, several similarities also existed in the procedures used and in the findings.

None of the studies included control over the teaching procedures used. While this is a major weakness, since achievement differences could have resulted from differences in teaching methodology, it is a difficulty not overcome in the present study. None of the studies looked at achievement measures other than the percent of notes accurately transcribed. Separate consideration was not given to transcription rates or to the English errors made (punctuation, spelling, capitalization, etc.). Since these are two important components of shorthand transcription, their omission makes the evaluation of shorthand achievement incomplete. These two achievement measures were included in this study.

With regard to findings, five of the seven studies found Gregg shorthand to result in lower achievement at the end of the school year

than that attained with another system. In all of the studies including Forkner shorthand, this system was judged to be superior. In two of the three studies including Century 21 shorthand, this system was found to result in higher achievement for more students than did Gregg shorthand. In all of the studies, however, no shorthand system resulted in accuracy scores on dictation tests at 80 wpm that could be considered vocational skill levels for most students.

Chapter 3

PROCEDURES

This chapter describes the design and procedures of the study and is organized as follows: 1) pretest measures (independent variables); 2) shorthand attitude inventory; 3) shorthand achievement measures (dependent variables); 4) data collection procedures; 5) test scoring procedures and test reliability; 6) student sample; and 7) data analysis.

Pretest Measures

The following four tests were used to determine abilities of students prior to beginning shorthand instruction that might be related to their later achievement: Revised Byers' First-Year Shorthand Aptitude Test, Thorndike 20-Word Vocabulary Test, Spelling Test, and Cooperative English Test. Each is briefly described.

Revised Byers' Shorthand Aptitude Test

The Revised Byers' Shorthand Aptitude Test was a 25-minute examination consisting of three subtests: Phonetic Perception (40 items), Observation Aptitude (25 items), and Disarranged Syllables (40 items). These three subtests measured verbal abilities and observational abilities related to success in learning a symbolic shorthand system. The Phonetic Perception test asked students to read a word written with alphabetic letters according to sound. Correct recognition of this word was indicated by selecting a word having the same meaning from a list of four choices. Both the ability to recognize words by their sounds and general vocabulary level were measured by this subtest.

The Disarranged Syllables test was also a test of verbal ability. In this test the syllables of two words, an adjective and a noun, were arranged in random fashion. The student was to mentally rearrange the syllables to form the correct adjective-noun pair. The student then indicated this correct arrangement by identifying the last syllable of the second word, the noun. Vocabulary level was an important part of this test, but it also measured the "word sense" necessary to read incomplete or missing shorthand notes.

The Observation Aptitude subtest asked the student to look at a figure comprised of circles, squares, curved lines, and straight lines. The student was to choose a second figure from among four choices that was the opposite of the test figure--squares replaced circles, curved lines replaced straight, and vice versa. High scores on this test depended upon making these selections quickly.

Validity and reliability of this test battery as a predictor of first-year shorthand achievement were obtained in 1971 by Lambrecht. The three subtests had internal consistency reliability coefficients (KR_{20}) of $r = .82$ for Phonetic Perception, $r = .73$ for Observation Aptitude, and $r = .89$

for Disarranged Syllables. When scores on these subtests were used to predict shorthand achievement on a partial transcription test consisting of seven 24-minute letters dictated at speeds ranging from 45 to 75 wpm, the battery had a validity coefficient of $r = .56$. These data were determined for approximately 700 high school students learning Gregg shorthand. Similar reliability and validity data do not exist for samples of students learning any other shorthand system. This limitation is true for all known published shorthand aptitude test batteries.

Vocabulary Test

In addition to the Shorthand Aptitude Test, a second measure was used to determine the verbal ability of the shorthand students in this study. The Thorndike 20-Word Vocabulary Test (Form 2) from the I.E.R. Intelligence Scale CAVD of Thorndike and others (Buros, 1965) was known to be a measure of verbal intelligence highly correlated with the WAIS (Wechsler Adult Intelligence Scale). When corrected for attenuation, Miner (1961) has reported a correlation with the WAIS scale of at least $r = .75$. Thorndike (1942) reported a reliability coefficient of $r = .83$ between two of the five forms of the vocabulary test.

Since this short vocabulary required only about five minutes of testing time, it was thought that it might be used to strengthen or to replace parts of the Revised Byers' Shorthand Aptitude Test. Use of this test in this study would show if this expectation were correct as well as provide a second measure of verbal ability to control differences among the shorthand students.

Spelling Test

The quality of transcription is affected not only by students' abilities to record shorthand notes from dictation accurately and completely, but also by their ability to transcribe these notes into correct English. Spelling is one important aspect of this correctness, and students who already possess skill in this area will probably achieve higher quality transcripts than those who do not. The spelling test developed by Casady (1973) was used to determine this ability.

This untimed test consisted of 30 items, each item containing four words. The student was to select the one word of the four, if any, that was misspelled. The validity of this spelling test rests on its compilation from the DDC (Dictation Disc Corporation) list of 500 most frequently misspelled words and the NOMA (National Office Management Association--now known as AMS, Administrative Management Society) list of 600 frequently misspelled words. There are no predictive validity data relating scores on this test to spelling scores in shorthand transcription. Casady (1973) reported a test-retest reliability coefficient of $r = .85$ for 102 high school seniors and $r = .89$ for 104 college seniors.

Cooperative English Test

To further control students' abilities to correctly handle English style elements, the Cooperative English Test revised by Casady (1973) was used. This untimed 100-item test consisted of three parts: Usage (50 items), Punctuation (30 items), and Capitalization (20 items). The test measures such skills as proofreading, error location, and skill in written expression (Harris, 1953).

Although the validity of the test has not been established for shorthand transcription, there was positive correlation between it and scores on the English examination of the New York Board of Regents; the coefficients ranged from $r = .70$ to $r = .79$ (McCullough and Flanagan, 1939). Casady (1973) reported test-retest reliability coefficients for the complete test of $r = .92$ for 102 high school seniors and $r = .89$ for 104 college seniors. Permission was obtained from the Educational Test Service, publishers of the test, to reproduce and use the Casady revision. (See Appendix A, p. 91)

Shorthand Attitude Inventory

A Shorthand Attitude Inventory consisting of eight statements was administered three times to determine the attitudes of high school students toward learning shorthand prior to beginning the first-year course, midway through the course, and at the end of the school year. The Shorthand Attitude Inventory developed by Gilmore (1975) was used as the instrument. Figure 1 lists the eight statements contained on this untimed test.

Figure 1

Shorthand Attitude Inventory List of Statements

1. I think shorthand is easy to learn.
2. I think shorthand requires lots of effort and practice.
3. I think learning shorthand can be fun.
4. I plan to use my shorthand skill as an office employee after high school graduation.
5. I plan to continue my education after high school.
6. I plan to get an office job after high school graduation.
7. I believe that I can succeed in learning shorthand.
8. I am interested in learning shorthand.

For each statement, a student was to indicate whether he or she "strongly agreed," "agreed," was "undecided," "disagreed," or "strongly disagreed." These reports were anonymous in order to encourage candid responses. This anonymity, however, also meant that changes in attitudes by individual students could not be observed. Neither could attitudes of individual students be related to their shorthand achievement.

When Gilmore used this instrument, reliability data were not available. It was, therefore, necessary to determine the reliability of this instrument as part of this study. This was done by administering the inventory to beginning shorthand students who were not part of the main shorthand achievement study. Three stability measures of reliability were obtained by administering the instrument twice to 41 high school students with one week between administrations. These three measures are described below as stability of individual student's inventory scores, stability of individual item scores, and similarity of the item responses on two administrations.

Stability of Individual Inventory Scores

Individual scores on the attitude inventory were determined by assigning each item response a weight and averaging these weights for the eight statements. A response of "strongly agree" was weighted 5; "agree" was 4, "undecided," 3; "disagree," 2; and "strongly disagree," 1. The scores for each of the 41 students on the two administrations were correlated to determine their relationship. This correlation coefficient was a reliability measure of stability.

Table 1 contains the mean scores and standard deviations for the 41 students on the two administrations and the correlation coefficient of $r = .89$. Students' attitudes as measured on this inventory were relatively stable over the time period of one week.

Table 1

Shorthand Attitude Inventory
Test-Retest Reliability of Student Average Scores
on Eight Statements
(N = 41)

mean		standard deviation		r
1 Admin.	2 Admin.	1 Admin.	2 Admin.	
3.42	3.42	0.5386	0.4515	
				0.89

Stability of Item Scores

A second way to examine the stability of the attitude inventory scores was to ask how similar the class's attitudes were on a single item on both administrations. An item score was determined by averaging the weights for the responses of the 41 students on a single item. Table 2 shows the weighted average score on each of the eight items on the two administrations. The correlation between these item scores was $r = .88$. Again, attitudes of the class as a whole on each statement were relatively stable over the one-week period.

Table 2

Shorthand Attitude Inventory Test-Retest Reliability of Eight-Item Scores (N = 41)

Item No.	Item Weighted Average Score	
	1 Admin.	2 Admin.
1	3.88	3.49
2	4.15	4.24
3	3.61	3.54
4	3.24	3.27
5	3.93	3.95
6	3.42	3.56
7	4.02	4.05
8	4.02	4.00
mean	3.78	3.76
s.d.	0.3030	0.3181
r	0.88	

Similarity of Item Responses

A third way to examine the stability of responses on the attitude inventory was to ask how many students made exactly the same response on both administrations. A tally such as that illustrated in Figure 2

Figure 2

Shorthand Attitude Inventory
Tally of Response Similarity on
Two Administrations

Item No. 1
(N = 41)

1st Administration

2nd Administration

	strongly agree	agree	undecided	disagree	strongly disagree
strongly agree	2	2			
agree		20		1	
undecided		3	5	1	
disagree			2	5	
strongly disagree					0
	78.05 +19.51 97.56% 32 on diagonal = 78.05 % 8 one-off diagonal = 19.51 %				

was made for each statement. The responses which fell on the diagonal of the cross tabulation were identical on both administrations. Responses that were one-off the diagonal were those in which the student's response change from one degree of agreement to the adjacent degree.

Table 3 shows the proportion of students whose responses were identical on each administration (on the diagonal) and also the proportion of students whose responses changed slightly (one-off the diagonal). The average percent on the diagonal for the eight items was 76.53 percent. The average percent one-off the diagonal for the eight statements was

Table 3

Shorthand Attitude Inventory
Agreement of First and Second Responses to
Eight Statements
(N = 41)

Statement No.	% on Diagonal (1)	% 1-off Diagonal (2)	Sum % of (1) + (2)
1	78.05	19.51	97.56
2	65.85	26.83	92.68
3	80.49	12.20	92.69
4	68.29	31.71	100.00
5	80.49	19.51	100.00
6	82.93	14.63	97.56
7	75.61	24.39	100.00
8	80.49	19.51	100.00
Avg.	76.53%	21.04%	97.56%

21.04 percent. The average sum of these proportions, 97.56 percent, indicates that the responses of individual students on two administrations one week apart were very similar.

Shorthand Achievement Measures

Shorthand achievement was measured by administering a series of dictation tests at three speeds at the middle of the school year (MOY) and at the end of the school year (EOY). At the middle of the year, or when students had completed the introduction of the theory of the shorthand system they were learning, the three dictation speeds were 50, 60 and 70 wpm. At the end of the school year, these rates were raised to 60, 70 and 80 wpm. Except for the actual letters used, the dictation material and procedures were the same each time.

At each of the dictation speeds, three letters containing approximately 100 standard shorthand words were dictated. A total of nine letters were therefore dictated at both the middle and end of the year. Students were to take this dictation on three different days and on each testing day to write one letter each at 50, 60 and 70 wpm (MOY) or one letter each at 60, 70 and 80 wpm (EOY).

There were three reasons for selecting short letters for the dictation tests rather than the two- or three-minute dictation tests used in previous studies. First, since achievement on the longer dictation had been shown to be relatively low, it was thought that shorter dictation would be easier. The 100-word letters were also more typical of the length of actual business letters than were the 150- to 240-word letters of the longer dictation. If higher accuracy scores could be achieved on this shorter material, the judgment might also be made that employable skills were being attained.

A second reason for choosing the shorter letters was to facilitate the administration of several dictation tests without increasing the amount of testing time required to that which would be objectionable to high school teachers. If previous studies have underestimated the actual dictation skill of students because only one test was used, perhaps three testing sessions would result in performance measures more typical of students' actual skill. It was also necessary, however, that all students transcribe all of the dictation at each rate. This would not be possible within one class period unless the letters at each dictation speed were short. The alternative of asking for 18 testing days instead of 6 to permit one dictation speed per day did not seem reasonable. It was reasonable to assume that most students could transcribe three 100-word letters within one class period.

The third reason for choosing several shorter letters was related to the problem of controlling the difficulty level of the letters. The vocabulary in the letters was controlled as one way to maintain consistency of difficulty, since several studies (Hillestad, 1960; Uthe, 1966; and Mickelson, 1971) have shown that vocabulary level is an important factor affecting the difficulty of dictation materials. Controlling this factor alone, however, is not sufficient to maintain a consistent degree of difficulty (Pullis, 1975 and 1976). One way to overcome this problem is not to depend upon one measure of skill at a single speed, but to obtain several measures, averaging the scores on each to obtain a single more stable score. That such average scores are indeed more stable measures is illustrated in the later discussion of the reliability of these dictation tests.

Table 4 provides descriptive data for the 18 business letters used as the MOY and EOY tests. The letters were chosen and revised from two sources so that between 60 and 70 percent of the words in these letters would be "common words," or words from among the first 200 most frequently used words on the Perry word list (Perry, 1970). The two sources from which these letters were obtained were Shorthand: Vocabulary and Speed Tests (Smith and Reese, 1974) and Dictation Tests (Balsley, 1973). Appendix B, pages 93 to 110, contains these letters with specific identification of their source.

Data Collection Procedures

This section describes the procedures used to secure approval to use human subjects in research, the collection of the pretest data, and the collection of the middle- and end-of-year shorthand achievement data.

Table 4

Shorthand Dictation Achievement Tests
Middle- and End-of-Year Test Letters at Three Speeds

Test Letters	Standard Words	Actual Words	% Common Words	Syllabic Intensity
Middle of Year				
<u>50 wpm</u>				
1	100	98	64.89	1.43
2	100	91	69.66	1.54
3	<u>100</u>	<u>94</u>	<u>61.70</u>	<u>1.49</u>
Avg.	100	93	65.42 %	1.49
<u>60 wpm</u>				
1	100	96	61.70	1.46
2	106	107	60.00	1.39
3	<u>103</u>	<u>98</u>	<u>68.69</u>	<u>1.47</u>
Avg.	103	100	63.46 %	1.44
<u>70 wpm</u>				
1	110	108	62.96	1.43
2	106	105	60.95	1.41
3	<u>103</u>	<u>104</u>	<u>67.02</u>	<u>1.39</u>
Avg.	106	106	63.64 %	1.41
End of Year				
<u>60 wpm</u>				
1	100	94	70.21	1.49
2	100	87	62.07	1.61
3	<u>100</u>	<u>90</u>	<u>65.56</u>	<u>1.56</u>
Avg.	100	90	65.95 %	1.55
<u>70 wpm</u>				
1	104	106	59.43	1.37
2	114	115	59.13	1.46
3	<u>111</u>	<u>104</u>	<u>64.42</u>	<u>1.51</u>
Avg.	110	108	60.99 %	1.45
<u>80 wpm</u>				
1	110	111	64.86	1.41
2	110	105	63.81	1.48
3	<u>110</u>	<u>113</u>	<u>64.29</u>	<u>1.38</u>
Avg.	110	110	64.32 %	1.42

Approval to Use Human Subjects in Research

Before data could be collected, it was necessary to secure approval of the data collection procedures from the University of Minnesota Committee on the Use of Human Subjects in Research. Federal and university regulations require that human subjects be protected in research by being informed of the purpose of the research in which they are asked to participate and the procedures being followed. Subjects are to be allowed the option of withdrawing from any research to which they object.

The data being collected in this study were not considered to be different from those normally obtained by teachers in shorthand classes. For this reason the Committee approved the procedure of informing students and their parents of the purpose of this study and giving either students or parents the option of asking that the student's scores not be released outside of the high school if they wished. Appendix C, pages 111 to 115, contains the correspondence describing and approving this procedure.

A total of seven students in three of the 20 schools participating asked that their scores not be included in the study. These students were included among the number of students enrolled in the shorthand classes, but their scores were pulled from the data analysis. They were, in effect, "missing data." Because this number of students was so small, no comparisons of these students' pretest scores were made with the remaining students.

Collection of Pretest Data

Pretests consisting of the Revised Byers' Shorthand Aptitude Test, Thorndike 20-Word Vocabulary Test, Spelling Test, Cooperative English Test, and the Shorthand Attitude Inventory were administered during the first two weeks of school in the fall of 1975. The printed tests were delivered to each high school teacher along with written instructions for their administration. Appendix D, page 116, contains these instructions.

When all of the tests had been administered, they were either mailed back to the researcher or picked up at the high school. When all of these objective tests had been scored, the summary scores for the attitude inventory and a listing of each student's scores on the other pretests were mailed to each shorthand teacher.

Collection of Shorthand Achievement Data

The middle- and end-of-year dictation letters were recorded on tape to maintain consistency of the dictation. All of the tapes were duplicated from a single master tape, and each was checked to make sure that the dictation was complete and audible.

The taped dictation for the MOY tests, Shorthand Attitude Inventory, and administration instructions were mailed to the participating shorthand teachers in early December 1975. Teachers were asked to administer the dictation tests as soon as students had completely covered the theory of

the shorthand system they were learning, preferably during the 16th, 17th, or 18th weeks of school. This meant that the tests were not administered at the same time in all of the high schools. One class of 10 students took these tests at the end of December 1975, before the Christmas break. One class of 59 students took these tests at the end of March 1976. The remainder of the students, 94 percent, took these tests during the month of January 1976.

Appendix D, pages 117 to 121, contains a copy of the administration instructions which teachers received for the MOY tests. The Shorthand Attitude Inventory was to be given for a second time on a different day from one chosen for the dictation. On each of the three days required for the dictation tests, teachers were to play the taped dictation which included a short "warm-up" letter at 60 wpm (not to be transcribed) and three test letters at 50, 60 and 70 wpm. After the dictation students were to begin transcription with the 50 wpm letter and proceed to the 60 and 70 wpm letters. Transcription could be either in longhand or at the typewriter. As each letter was completed, students were to raise a hand so that the teacher could record the elapsed time on each letter. This elapsed time was the number of minutes and quarter minutes which had passed since the beginning of the transcription period.

When the three days of dictation had been completed, the following materials were returned to the researcher: the transcripts of nine letters, three at 50 wpm, three at 60 wpm, and three at 70 wpm; the shorthand notes for these nine letters, the completed Shorthand Attitude Inventories, and the dictation tape.

At the end of the school year the test administration procedures were the same as those used at the middle of the year. Teachers were asked to choose three days for testing during the last three weeks of the school year. In April 1976 the taped dictation of nine letters at 60, 70 and 80 wpm was mailed to teachers along with the Shorthand Attitude Inventory and administration instructions. Appendix D, pages 122 to 126, contains a copy of these instructions. When the EOY testing was completed, teachers returned the following to the researcher: the transcripts of nine letters, three at 60 wpm, three at 70 wpm, and three at 80 wpm; the shorthand notes for these nine letters, the completed Shorthand Attitude Inventories, and the dictation tape.

Test Scoring Procedures and Test Reliability

This section of the chapter describes the procedures used to determine the percent of accuracy, percent of English errors, and transcription rates on the dictation tests. The procedures followed to determine the reliability of these scores are also described. The MOY and EOY dictation tests were of necessity hand-scored with the aid of several graduate assistants at the University of Minnesota. One graduate assistant served as a supervisor through all of the test scoring to assure that similar procedures were followed by all assistants involved. When the scoring was completed for the entire year, tally sheets of the students' scores were mailed to each instructor.

Percent of Accuracy Scores

The first score determined on each letter was the percent of the actual words dictated which were transcribed correctly. Only omissions or incorrect words were counted as errors. Added words, incorrect spelling, or typewriting errors were not counted as errors. The number of correct words was divided by the number of actual words dictated to obtain the percent of accuracy for each letter. For the three letters at the same dictation speed, the percent of accuracy scores were averaged to yield one percent of accuracy score at each speed: 50, 60 and 70 wpm at the MOY and 60, 70 and 80 at the EOY testing. If a student missed two of the three days of dictation, his or her score was not included.

Percent of English Errors

After the letters had been scored for accuracy of the transcript as described above, the correct transcription was scored for English errors. These included the following:

- 1) Incorrect spelling (including typewriting errors not corrected)
- 2) Incorrect punctuation
- 3) Incorrect word division
- 4) Incorrect capitalization
- 5) Incorrect number expression
- 6) Holes in the paper or other especially messy erasures.

Inside addresses were not dictated and therefore not transcribed. Paragraphing was not dictated and paragraphing decisions were not considered in scoring. Letter placement on the page was not considered. Envelopes and carbon copies were not prepared.

Each of the 18 letters in the dictation tests was reviewed with the grading assistants to establish alternative but acceptable ways for expressing any of the English style elements listed above. The total number of English errors was tallied for each transcribed letter. For the three letters at the same speed, these errors were averaged to yield one English error score.

These average English error scores could not be used directly in the data analysis because they did not represent a linear measure of achievement. Students could have low English error scores because they were highly skilled in this area or because they transcribed very little of the letter correctly. In other words, the more of their notes students could transcribe, the more opportunity they had to make English errors. For this reason the English errors were converted by the following formula to obtain a percent of the actual number of words transcribed correctly:

$$\% \text{ English Error} = \text{English Errors} / (\text{Actual Words} \times \% \text{ Accuracy})$$

where

$$\text{English Errors} = \text{Student's Average English Errors on 3 Letters at One Dictation Rate}$$

Actual Words = Average Number of Actual Words in 3 Letters
at One Dictation Rate

% Accuracy = Student's Average % of Accuracy on 3 Letters
at One Dictation Rate

These conversions were performed by computer using each student's average English error score and average percent of accuracy score which were punched on data cards. The score used in all data analysis was the percent of English error score for each student at each dictation speed: 50, 60 and 70 wpm at the MOY and 60, 70 and 80 wpm at the EOY.

Transcription Rate

Each letter submitted for each student contained a notation of the elapsed time from the beginning of the transcription period. For the first letter transcribed, the lowest dictation speed, this elapsed time also represented the completion time for that letter. At each higher dictation speed the completion time was computed by subtracting the elapsed time for the letter at the next lower dictation rate. Completion times were calculated for all letters and recorded in minutes and decimal portions of a minute at quarter-minute intervals. For all letters transcribed from dictation at the same rate, these completion times were averaged to yield an average completion time for each dictation rate.

If the elapsed time had not been recorded correctly on a student's paper, this score was omitted for that student. This was most likely to happen when a student had attempted to record a completion time for each letter rather than the elapsed time. If there was a question about the accuracy of the times or the accuracy of the subtraction could not be checked, these times were not used. Since it is not common for teachers to collect this kind of score, doubtful accuracy of this score on several papers resulted in "missing data" for these students.

As was true with the English error score, completion times did not represent a linear measure of achievement which could be used directly in subsequent data analysis. Students could have low completion times because they transcribed very quickly or because they could read very little of their notes. It was necessary to convert these scores to correct words transcribed per minute using the following formula:

Transcription Rate in WPM = (Actual Words X % Accuracy) / Completion Time

where

Actual Words = Average Number of Actual Words in 3 Letters
at One Dictation Rate

% Accuracy = Student's Average % of Accuracy on 3 Letters
at One Rate

Completion Time = Student's Average Completion Time on
3 Letters at One Dictation Rate

Again, these conversions were performed by computer using each student's average completion time score and average percent of accuracy score which were punched on data cards. The score used in all data analysis was the transcription rate in words per minute for each student at each dictation speed: 50, 60 and 70 wpm at the MOY and 60, 70 and 80 wpm at the EOY.

Reliability of Achievement Tests

The test-retest reliability of each of the above scores was determined by administering the same dictation tests twice in high schools not participating in the main achievement testing. Appendix D, page 127, contains a copy of the administration instructions used for this testing.

A different high school was used for each dictation speed so that minimum testing time would be required in each class. The three letters at each dictation speed were administered twice one week apart. For example, in one school the three letters at 50 wpm were recorded from taped dictation by a group of shorthand students. These same students wrote and transcribed the same three letters one week later. Pairs of scores for average percent of accuracy, average percent of English error, and average transcription rate were used in the calculation of the product-moment correlation to obtain a measure of stability for these scores.

Because beginning shorthand students could not be expected to write at the higher speeds in the fall of the school year, second-year classes were used for the reliability testing. For the 50 wpm dictation, however, the second-year students' scores were all quite high and had very little variability, resulting in a low correlation. These 50 wpm tests were therefore administered to a new first-year shorthand class in the middle of the school year to obtain reliability data from students with less shorthand skill and therefore more variable scores.

Table 5 summarizes the reliability measures obtained at 50, 60, 70 and 80 wpm for the percent of accuracy, percent of English error, and transcription rate scores. Except for the second-year class taking the 50 wpm dictation, the percent of accuracy scores had reliability coefficients ranging from $r = .70$ at 60 wpm to $r = .93$ at 80 wpm. The reliability coefficients for the percent of English error scores (excluding the second-year, 50-wpm group) ranged from $r = .51$ at 80 wpm to $r = .75$ at 60 wpm. The reliability of the transcription rate scores ranged from $r = .67$ at 70 wpm to $r = .92$ at 80 wpm.

English errors appeared to be the least stable measure. This is perhaps the result of including typewriting errors in these scores, an error considered to be a more random occurrence. As a whole, the reliability coefficients were not as high as would be desired, and this may be an indication that the length of the letters was too short.

To see if the averaging of scores on three tests rather than using a single score affected reliability, correlations were calculated between the single scores for a group of 75 students from the main achievement testing sample. The scores obtained on the first administration were correlated with the same scores on the second and third administrations at the same dictation speed. This in effect was a parallel-form measure of

Table 5

Test-Retest Reliability
 Shorthand Dictation Tests at 50, 60, 70 and 80 wpm
 Percent Accuracy, Percent English Errors, and Transcription Rate Scores

Dictation Speed	N	Percent Accuracy			Percent English Error			Transcription Rate		
		$\bar{X}$	s.d.	r	$\bar{X}$	s.d.	r	$\bar{X}$	s.d.	r
50 wpm (1st yr. class)	1	37	89.03 %	9.83	.91	5.08 %	2.03	12.49 wpm	2.89	.78
	2		92.67 %	7.64		5.42 %	2.40	15.86 wpm	3.01	
50 wpm (2nd yr. class)	1	11	97.46 %	1.47	.52	3.91 %	1.00	19.88 wpm	3.37	.77
	2		98.11 %	0.99		3.86 %	1.62	24.03 wpm	4.96	
60 wpm (2nd yr. class)	1	12	94.07 %	6.24	.70	4.45 %	2.72	18.26 wpm	5.03	.84
	2		98.06 %	3.06		3.98 %	2.03	22.03 wpm	5.58	
70 wpm (2nd yr. class)	1	16	76.37 %	9.21	.79	4.46 %	1.60	10.68 wpm	2.04	.67
	2		78.24 %	8.05		5.17 %	2.08	13.44 wpm	3.18	
80 wpm (Two 2nd yr. classes)	1	27	74.00 %	14.18	.93	5.35 %	2.22	12.82 wpm	3.29	.92
	2		82.43 %	12.83		4.92 %	2.02	15.56 wpm	3.27	

reliability since the same material was not dictated twice, rather a similar letter at the same speed was dictated a second and third time. These correlation coefficients are included in Appendix E, page 129. Examination of these will show that the reliability of each of the achievement measures, percent of accuracy, percent of English error, and transcription rate at the three dictation speeds of 50, 60 and 70 wpm were lower than those reported in Table 5. Average scores are more stable than pairs of single measures at the same dictation rate.

Student Sample

The students participating in this study were learning either Gregg, Forkner or Century 21 shorthand in 20 high schools in the Twin Cities metropolitan area. These schools were selected because 14 of them were known to be teaching Forkner shorthand and two to be teaching Century 21 shorthand. The remaining four high schools teaching only Gregg shorthand were asked to participate in order to make the number of students learning Gregg shorthand comparable to the number learning Forkner shorthand. This selection was not random. A total of 16 high schools in the Twin Cities area were known to be teaching Forkner shorthand. Two of these did not consent to participate in the study. No other schools who were asked refused. In the fall of 1975 permission was obtained from the principals in 20 high schools to administer the pretests and achievement tests used in this study.

Only first-year shorthand classes were included. A total of 33 different teachers taught these shorthand classes. No attempt was made to change or identify the instructional activities carried out by these teachers. Because one of the conditions under which these teachers agreed to participate in the achievement testing was that their schools', their students', and their own identity would not be revealed, these schools are not named in this report.

Some of the schools were teaching only one shorthand system; others taught two systems. Table 6 shows the number of students in schools of either type. Of the 1,317 students involved in the study, 24 percent were in schools in which only Forkner shorthand was taught. A smaller proportion, 15 percent, were in schools where only Gregg shorthand was taught. Even fewer, 4 percent, were in schools in which only Century 21 shorthand was taught. Approximately half of the students, 655, were in schools in which both Gregg and Forkner shorthand were taught. Seven percent were in schools teaching both Gregg and Century 21 shorthand.

Most of the students were 16-year-old girls (64 percent) and in the 11th grade (72 percent). As Crank, Crank and Hanrahan (1971-72) reported for Illinois, approximately 25 percent of the beginning shorthand students were seniors. Of the 13 boys enrolled, 10 were enrolled in Forkner shorthand, and all were seniors.

The number of students who had scores on each of the pretests, the achievement tests, and the three administrations of the Shorthand Attitude Inventory are presented in Table 7. A total of 638 Gregg shorthand students, 601 Forkner shorthand students, and 78 Century 21 shorthand students

Table 6

Sample Size in High Schools
Teaching One or Two Shorthand Systems

School Type	System						Total	
	Gregg		Forkner		Century 21			
	N	%	N	%	N	%	N	%
Forkner Only			315	23.92			315	23.92
Gregg Only	196	14.88					196	14.88
Century 21 Only					55	4.18	55	4.18
Forkner & Gregg	369	28.02	286	21.72			655	49.73
Century 21 & Gregg	73	5.54			23	1.74	96	7.29
Total	638	48.44	601	45.63	78	5.92	1317	100.00

were enrolled in the beginning shorthand classes. Because of dropouts, absences, or unuseable test data, different numbers of students had scores available for analysis on each of the tests. A total of 1,091 students had scores at the middle of the school year. This number was reduced to 907 at the end of the school year. Part of this reduction included 55 students who were enrolled in one-semester Forkner shorthand classes. While these students were not in shorthand at the end of the year, they were not considered "dropouts."

"Dropouts" at the middle and the end of the school year were identified by the teachers as students who had withdrawn from the shorthand class. The reasons for their withdrawal were not obtained. The Chi-square analysis in Table 8 for the MOY dropouts and in Table 9 for the EOY dropouts shows that the proportion of students in this category was not significantly different for Gregg, Forkner or Century 21 shorthand. Overall, approximately 72 percent of the students who began a one-year shorthand course completed the school year. The proportion of Gregg shorthand students finishing was 73.4 percent; for Forkner shorthand the proportion was 71.1 percent. For Century 21 shorthand the proportion was 65.4 percent. When a Z-test of proportions was used to compare this figure to the proportion obtained for Gregg and Forkner shorthand, the Z-value of 1.294 was again not significant at the $p = .05$ level.

Table 7

Size of High School Student Sample
on Each Test Administered
for Gregg, Forkner and Century 21 Shorthand

Tests	System			Total
	Gregg	Forkner	Century 21	
Total Sample	638	601	78	1,317
<u>Pretests</u>				
Revised Byers' Shorthand Aptitude Test	565	570	69	1,204
Vocabulary	568	572	70	1,210
Spelling	539	567	69	1,175
Cooperative English Test	539	567	69	1,175
<u>Middle-of-Year Dictation Tests</u>				
<u>50 wpm</u>				
% Accuracy	529	507	55	1,091
% English Error	529	507	55	1,091
Transcription wpm	517	488	55	1,060
<u>60 wpm</u>				
% Accuracy	506	503	56	1,065
% English Error	506	503	56	1,065
Transcription wpm	495	479	55	1,029
<u>70 wpm</u>				
% Accuracy	501	479	56	1,036
% English Error	501	478	56	1,035
Transcription wpm	490	466	55	1,011

Table 7, Continued

Tests	System			Total
	Gregg	Forkner	Century 21	
<u>End-of-Year Dictation Tests</u>				
<u>60 wpm</u>				
% Accuracy	468	388	51	907
% English Error	468	388	51	907
Transcription Rate	453	377	50	880
<u>70 wpm</u>				
% Accuracy	467	385	50	902
% English Error	467	385	50	902
Transcription Rate	451	373	50	874
<u>80 wpm</u>				
% Accuracy	453	375	48	876
% English Error	453	375	48	876
Transcription Rate	444	361	46	851
<u>Shorthand Aptitude Inventory</u>				
Beginning of Year	564	576	72	1,212
Middle of Year	451	489	54	994
End of Year	391	353	50	794
<u>Dropouts at MOY</u>	144	148	26	320
% of Total Sample	22.57%	24.63%	33.33%	24.30%
<u>Dropouts at EOY</u>	170	158	27	355
% of Total Sample	26.65%	28.94%	34.62%	28.13%
1 Semester Students, not Dropouts	0	55	0	55
Total EOY Sample	468	388	51	907

Table 8

Middle-of-Year Comparison of Dropouts for
Gregg, Forkner, and Century 21 Shorthand

	Gregg		Forkner		Century 21		Total
	O	E	O	E	O	E	
Dropouts	144	154.05	148	145.12	26	18.83	318
	22.57%		24.63%		33.33%		24.15%
Non-Dropouts	494	483.95	453	455.88	52	59.17	999
	77.43%		75.37%		66.67%		75.85%
Total	638		601		78		1317

$$\chi^2 = 4.54 \text{ with 2 d.f. n.s.d. at } p < .05.$$

Table 9

End-of-Year Comparison of Dropouts for
Gregg, Forkner, and Century 21 Shorthand

	Gregg		Forkner		Century 21		Total
	O	E	O	E	O	E	
Dropouts	170	179.47	158*	154.59	27	21.94	355
	26.65%		28.94%		34.62%		28.13%
Non-Dropouts	468	458.53	388*	392.41	51	56.06	907
	73.35%		71.06%		65.38%		71.87%
Total	638		546*		78		1262*

* Excludes 55 students in one-semester Forkner Shorthand Classes.

$$\chi^2 = 1.44 \text{ with 2 d.f. n.s.d. at } p < .05.$$

Data Analysis

The scores on the pretest measures and the shorthand achievement tests were analyzed using analysis of variance (one-way and two-way), analysis of covariance (one-way and two-way), and correlation analysis. The data obtained on the three administrations of the Shorthand Attitude Inventory were analyzed using Chi-square analysis and Mann-Whitney U analysis.

In all analyses the 0.01 level was chosen as that at which to reject the hypothesis of no differences between the group means analyzed. Because of the large sample, Type I errors (rejecting the hypothesis of no difference when only very small differences existed) were likely to occur. Using the 0.01 level of significance rather than a larger one reduced the likelihood of these errors. The actual probability levels are reported for each analysis so that others might choose different levels of significance if they wish.

Summary

This chapter has reviewed the procedures used to collect pretest, shorthand attitude, and shorthand achievement data from 1,317 beginning shorthand students in 20 Twin Cities area high schools teaching Gregg (N = 638), Forkner (N = 601), and Century 21 (N = 78) shorthand. Four pretests were administered in the fall of 1975: Revised Byers' Shorthand Aptitude Test, Thorndike 20-Word Vocabulary Test, a spelling test, and the Cooperative English Test. A Shorthand Attitude Inventory was administered at the beginning of the school year, in the middle of the year, and at the end of the school year. Reliability data collected for the Attitude Inventory showed this instrument to yield stable scores.

Shorthand dictation tests consisting of nine 100-standard word business letters were dictated at the middle of the year at 50, 60 and 70 wpm. At the end of the year similar letters were dictated at 60, 70 and 80 wpm. Three types of scores were obtained from these achievement tests: percent of accuracy of the transcript, percent of English errors in the transcript, and transcription rate. Reliability data were collected for these scores using first- and second-year shorthand students. The percent of accuracy and transcription rate scores were found to be more reliable than the percent of English error scores.

At the middle of the school year data were available from 1,091 students: 529 Gregg students, 507 Forkner students and 55 Century 21 students.

At the end of the school year data were available from 907 students: 468 Gregg students, 388 Forkner students and 51 Century 21 students. Approximately 27 percent of the students who began shorthand in all three systems did not complete the course.

Chapter 4

FINDINGS

The findings from the analysis of the pretest, shorthand achievement and shorthand attitude inventory data have been organized into eight main sections as follows: 1) comparisons of the pretest scores by shorthand system; 2) comparisons of shorthand achievement scores by system; 3) comparisons of shorthand achievement scores by type of transcript, either longhand or typewritten; 4) relationships between the pretest scores and shorthand achievement scores; 5) comparisons of shorthand achievement scores when accounting for pretest scores; 6) comparisons of shorthand achievement scores for Gregg and Forkner shorthand only in schools that taught both systems; 7) comparisons of attitude inventory scores between systems and at different administration times within shorthand systems; and 8) summary.

Comparisons of Pretest Scores

Four pretests were administered to determine if students learning either Gregg, Forkner or Century 21 shorthand differed on abilities considered to be related to potential shorthand achievement. The pretests were the Revised Byers' Shorthand Aptitude Test, the Thorndike 20-Word Vocabulary Test, a spelling test, and the Cooperative English Test. In this section two questions have been asked about the pretest data: 1) Do students learning the three shorthand systems differ on these scores? and 2) Do students who drop out of shorthand by the middle of the year differ from nondropouts on these pretests?

Comparisons of Shorthand Systems

The sample sizes, mean scores, and standard deviations on the four pretests for each shorthand system are presented in Table 10, page 38. Also included in this table is a summary of the one-way analysis of variance (ANOVA) comparing the mean scores for Forkner, Gregg and Century 21 shorthand. The F-ratio for each analysis and its associated probability of occurrence show that on none of the pretests were the differences significant at the 0.01 level.

Comparison of Dropouts and Nondropouts

As was illustrated in Table 8, page 34, 144 students had withdrawn from Gregg shorthand by the middle of the year, 148 had withdrawn from Forkner, and 26 from Century 21. The scores for these students on the pretests were compared with the scores of nondropouts. When these comparisons were made adding dropouts after the middle of the year, the results were the same as those presented here. Table 11, page 39, shows the pretest mean scores and standard deviations for dropouts and nondropouts in each of the shorthand systems. Table 12, page 40, summarizes the results of the two-way analysis of variance using shorthand system and dropout status as the two factors for which mean scores were compared.

Table 10

Pretest Scores
Means, Standard Deviations and Analysis of Variance Summary
Shorthand Aptitude, Vocabulary,
Spelling, and English Tests

Measure	System			Total	ANOVA Summary	
	Gregg	Forkner	Century 21		F Ratio	F Prob
<u>Revised Byers' Shorthand Aptitude Test</u>						
N	565	570	69	1204		
<u>Total Test Score (105)</u>						
$\bar{X}$	59.47	58.61	58.20	58.99	0.614	0.542
s.d.	13.48	15.48	14.03	14.49		
<u>Thorndike 20-Word Vocabulary</u>						
N	568	572	70	1210		
$\bar{X}$	9.80	9.90	9.81	9.85	0.233	0.792
s.d.	2.44	2.59	2.74	2.53		
<u>Spelling Test (30)</u>						
N	540	566	69	1175		
$\bar{X}$	11.66	11.35	10.67	11.45	2.151	0.117
s.d.	4.15	4.00	4.03	4.07		
<u>Cooperative English Test</u>						
N	540	566	69	1175		
<u>Total Test Score (100)</u>						
$\bar{X}$	64.37	63.69	64.51	64.05	0.760	0.468
s.d.	8.90	10.60	9.15	9.76		

Table 11

Pretest Scores for Middle-of-Year Dropouts and Nondropouts
Means and Standard Deviations for
Gregg, Forkner and Century 21 Shorthand Systems

Pretest	Dropouts				Nondropouts			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>Revised Byers'</u> <u>Shorthand Aptitude</u>								
N	134	136	19	289	431	434	50	915
<u>Total Score (105)</u>								
X	53.34	50.88	54.95	52.28	61.38	61.03	59.44	61.11
s.d.	11.90	15.44	12.24	13.73	13.38	14.70	14.58	14.08
<u>20-Word Vocabulary (20)</u>								
N	136	139	23	298	432	433	47	912
X	9.01	9.19	8.65	9.07	10.05	10.12	10.38	10.10
s.d.	2.30	2.55	2.55	2.44	2.43	2.57	2.67	2.51
<u>Spelling Test (30)</u>								
N	114	132	20	266	426	434	49	909
X	10.20	9.88	9.45	9.99	12.04	11.79	11.16	11.88
s.d.	4.13	3.49	3.63	3.78	4.08	4.03	4.11	4.06
<u>Cooperative English</u>								
N	114	132	20	266	426	434	49	909
<u>Total Score (100)</u>								
X	60.18	59.40	63.20	60.02	65.49	64.99	65.04	65.23
s.d.	7.71	11.62	9.23	9.96	8.87	9.92	9.16	9.39

Table 12

Summary of Two-Way Analysis of Variance
Pretest Scores by Shorthand System
by Middle-of-Year Dropout and Nondropout Status

Scores Compared	Main Effects				Interaction	
	System		Dropout Status		System x Dropout Status	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Revised Byers'</u> <u>Shorthand Aptitude</u> Total Score	0.569	0.999	87.086	0.001	1.285	0.276
<u>20-Word Vocabulary</u>	0.268	0.999	38.665	0.001	0.694	0.999
<u>Spelling Test</u>	1.625	0.195	44.852	0.001	0.019	0.999
<u>Cooperative English</u> Total Score	0.745	0.999	61.374	0.001	0.974	0.999

There were no significant main effects for the system factor--again confirming the results from Table 10, that pretest scores did not differ by system. On all of the pretests, however, there were significant main effects for dropout status. Students who withdrew from shorthand by the middle of the school year had significantly lower pretest scores than those who did not withdraw. There were no significant interaction effects between shorthand system and dropout status.

Comparisons of Shorthand Achievement Scores

Descriptive data for percent of accuracy, percent of English error, and transcription rate scores are presented below for the middle-and end-of-year dictation tests. Included with the descriptive data for Gregg, Forkner and Century 21 shorthand students are the results of the analysis of variance tests performed to locate any differences in achievement between the systems. More comprehensive descriptive data including frequency distributions are included in Appendix F, Tables A-2 to A-21, pages 130 to 149.

Comparisons of Middle-of-Year Achievement

The mean percent of accuracy scores for each shorthand system are presented in Table 13 for the middle-of-year tests. One-way analysis of

Table 13

Middle-of-Year
Shorthand Dictation Tests at 50, 60 and 70 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent Accuracy

Measure	System			ANOVA		Scheffe Location of Differences		
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement	Same Achievement
<u>50 wpm</u>								
N	529	507	55					
$\bar{X}$	63.63%	79.81%	73.78%	112.421	0.000	F	G	--
s.d.	18.40	16.16	18.48					
<u>60 wpm</u>								
N	506	503	56					
$\bar{X}$	53.47%	69.57%	62.45%	95.128	0.000	F	G	--
s.d.	18.19	18.69	20.34					
<u>70 wpm</u>								
N	501	479	56					
$\bar{X}$	41.73%	54.73%	49.14%	77.205	0.000	F	G	--
s.d.	15.29	17.50	15.93					

variance showed that significant differences existed at each dictation rate. The Scheffe procedure was used to identify those means which were different, and in each instance Forkner shorthand had the highest mean scores and Gregg shorthand the lowest.

The mean percent of English error scores for each system are shown in Table 14 with the results of the analysis of variance. Significant differences existed at all dictation speeds with Century 21 shorthand having the highest percent of English error (lowest achievement) and no differences existing between Gregg and Forkner shorthand.

The mean transcription rate scores are shown in Table 15, page 44, together with the analysis of variance results. Significant differences at each dictation rate show Forkner shorthand students to have the highest transcription rate. At 50 wpm no differences existed between Gregg and Century 21 shorthand; at 60 and 70 wpm Gregg shorthand students had higher transcription rates than Century 21 shorthand students.

Comparison of End-of-Year Achievement

The mean achievement scores for each shorthand system are shown in Table 16, page 45, for the end-of-year percent of accuracy scores. One-way analysis of variance showed that significant differences existed at 60 and 70 wpm favoring Forkner shorthand. There were no differences between Gregg and Century 21 shorthand at these speeds and no differences among the three systems at 80 wpm.

Table 17, page 46, summarizes the results of analysis of variance on the percent of English error scores. Mean scores for each system are included at each dictation speed. A significant difference was found only at 60 wpm where Forkner had the highest percent of error (lowest achievement). No difference was found using the Scheffe procedure between Gregg and Century 21 shorthand at this speed.

Differences among the systems were found at each dictation speed for transcription rate. Table 18, page 47, shows the mean transcription rates for each system and the ANOVA summary. Forkner shorthand students had the fastest transcription rates and Century 21 shorthand students the lowest rates at each dictation speed.

Comparisons of Achievement Scores by Transcript Type

At both the middle- and end-of-year testing sessions, students transcribed the dictation in either longhand or at the typewriter. Three questions can be raised about this difference in the transcript: 1) Did the type of transcript prepared differ among the three shorthand systems? 2) Did any of the achievement scores differ when this variable was considered? and 3) Were there achievement differences among the three systems when only one type of transcript was considered?

Table 14

Middle-of-Year
Shorthand Dictation Tests at 50, 60 and 70 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent English Error

Measure	System			ANOVA		Scheffe Location of Differences		
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement	Same Achievement
<u>50 wpm</u>								
N	529	507	55					
$\bar{X}$	8.73%	8.30%	11.16%	11.603	0.000		C 21	G & F
s.d.	4.03	4.26	5.17					
<u>60 wpm</u>								
N	506	503	56					
$\bar{X}$	10.28%	10.41%	12.90%	6.413	0.002		C 21	G & F
s.d.	5.49	4.92	5.35					
<u>70 wpm</u>								
N	501	478	56					
$\bar{X}$	7.70%	7.73%	12.43%	33.027	0.000		C 21	G & F
s.d.	4.34	3.83	6.10					

Table 15

Middle-of-Year
Shorthand Dictation Tests at 50, 60 and 70 wpm
Means, Standard Deviations and Analysis of Variance Summary
Transcription Rate

Measure	System			ANOVA		Scheffe Location of Differences		
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement	Same Achievement
<u>50 wpm</u>								
N	517	488	55					
$\bar{X}$ (wpm)	10.34	12.43	9.39	12.959	0.000	F		G & C 21
s.d.	4.03	9.50	4.06					
<u>60 wpm</u>								
N	495	479	55					
$\bar{X}$ (wpm)	10.02	11.41	8.67	22.667	0.000	F	C 21	
s.d.	3.57	4.16	3.81					
<u>70 wpm</u>								
N	490	466	55					
$\bar{X}$ (wpm)	10.17	11.10	8.81	12.157	0.000	F	C 21	
s.d.	3.78	4.17	3.38					

Table 16

End-of-Year
Shorthand Dictation Tests at 60, 70 and 80 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent Accuracy

Measure	System			ANOVA		Scheffe Location of Differences		
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement	Same Achievement
<u>60 wpm</u>								
N	468	388	51					
$\bar{X}$	89.56%	91.85%	86.07%	8.142	0.000	F		G & C 21
s.d.	11.51	9.59	19.65					
<u>70 wpm</u>								
N	467	385	50					
$\bar{X}$	78.90%	83.04%	77.29%	8.359	0.000	F		G & C 21
s.d.	16.43	14.19	21.06					
<u>80 wpm</u>								
N	453	375	48					
$\bar{X}$	67.54%	68.20%	64.7%	0.747	0.474			G, F, C 21
s.d.	18.40	18.30	20.9%					

Table 17

End-of-Year
Shorthand Dictation Tests at 60, 70 and 80 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent English Error

Measure	System			ANOVA		Scheffe Location of Differences		
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement	Same Achievement
<u>60 wpm</u>								
N	468	388	51					
$\bar{X}$	4.60%	5.16%	3.77%	7.264	0.001		F	G & C 21
s.d.	2.86	3.05	2.13					
<u>70 wpm</u>								
N	467	385	50					
$\bar{X}$	5.89%	6.56%	5.88%	4.258	0.014			G, F, C 21
s.d.	3.24	3.60	3.46					
<u>80 wpm</u>								
N	453	375	48					
$\bar{X}$	7.87%	8.41%	7.52%	2.347	0.096			G, F, C 21
s.d.	3.96	4.05	3.89					

Table 18

End-of-Year
 Shorthand Dictation Tests at 60, 70 and 80 wpm
 Means, Standard Deviations and Analysis of Variance Summary
 Transcription Rate

Measure	System			ANOVA		Scheffe Location of Differences		
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement	Same Achievement
<u>60 wpm</u>								
N	453	377	50					
$\bar{X}$ (wpm)	14.62	15.43	10.82	20.945	0.000	F	C 21	
s.d.	4.50	5.09	4.81					
<u>70 wpm</u>								
N	451	373	50					
$\bar{X}$ (wpm)	13.37	14.73	10.88	25.933	0.000	F	C 21	
s.d.	3.68	4.30	4.41					
<u>80 wpm</u>								
N	444	361	46					
$\bar{X}$ (wpm)	12.11	13.30	9.53	28.394	0.000	F	C 21	
s.d.	3.40	3.70	3.28					

Comparisons of Transcript Type by System

On the middle-of-year dictation tests 66 percent of the students transcribed their shorthand notes at the typewriter. Table 19 shows the proportion of students in each shorthand system who transcribed in either longhand or at the typewriter. Chi-square analysis of these proportions showed that there was a significant difference among the systems. Forkner students were more likely to use the typewriter. Century 21 students all used longhand, and Gregg students were more evenly divided between the two types of transcripts.

At the end of the school year 89 percent of the students were typewriting their transcripts. Table 20 shows the proportion of students in each system using each type of transcript. Again Chi-square analysis showed differences among the systems; all Forkner students used the typewriter. Almost all Gregg students, 83 percent, used the typewriter, but 60 percent of the Century 21 students used the typewriter.

Comparison of Achievement by Type of Transcript

The discussion of achievement comparisons between shorthand systems by type of transcript (typewritten or longhand) is divided into two parts: middle-of-year achievement data and end-of-year achievement data.

MOY achievement. Sample sizes, means and standard deviations are shown in Tables 21 - 23, pages 50 - 52, for each shorthand system categorized by type of transcript on the middle-of-year dictation. Descriptive data for percent of accuracy scores are in Table 21; percent of English error scores, in Table 22; and transcription rate scores in Table 23. The two-way analysis of variance of these scores by system and by transcript type is summarized in Table 24, page 53. The main effects by shorthand system parallel the results shown in Tables 13 - 15.

It was expected that the type of transcript, the second main effect, might have its greatest impact on the percent of English error scores (because typewriting errors were considered English errors) and on the transcription rate. While this expectation was true for transcription rate, it was not uniformly true for percent of English errors. One significant interaction was present for percent of English error at 60 wpm. Gregg students had the highest percent of error (lowest achievement) on the typewritten transcripts, but the lowest percent of error (highest achievement) on the longhand transcripts.

For transcription rate, significant main effects existed for the type of transcript at 60 and 70 wpm, and significant interaction effects were present between shorthand system and transcript type at all dictation rates. On the whole, transcription was faster with longhand transcripts. Forkner students had higher transcription rates on the typewritten transcripts, but lower transcription rates than Gregg shorthand on the longhand transcripts.

Significant main effects for type of transcript also occurred for percent of accuracy scores at 60 and 70 wpm. Mean scores were higher for students with typewritten transcripts.

Table 19

Middle-of Year
Comparison of Use of Longhand or Typewritten Transcripts
for Gregg, Forkner and Century 21 Shorthand Systems

	Gregg		Forkner		Century 21		Total
	O	E	O	E	O	E	
Longhand Transcripts	235	179.89	81	172.41	55	18.70	371
	44.42%		15.98%		100.00%		34.00%
Typewritten Transcripts	294	349.11	426	334.59	0	36.30	720
	55.58%		84.02%		0%		66.00%
Total	529		507		55		1091
	100 %		100 %		100 %		100 %

$\chi^2 = 205.79$ with 2 d.f. at $p < .01$. (significant)

Table 20

End-of-Year
Comparison of Use of Longhand or Typewritten Transcripts
for Gregg, Forkner and Century 21 Shorthand Systems

	Gregg		Forkner		Century 21		Total
	O	E	O	E	O	E	
Longhand Transcripts	81	52.11	0	43.21	20	5.68	101
	17.31%		0%		39.22%		11.14%
Typewritten Transcripts	387	415.89	388	344.79	31	45.32	806
	82.69%		100 %		60.78%		88.86%
Total	468		388		51		907
	100 %		100 %		100 %		100 %

$\chi^2 = 107.28$ with 2 d.f. at $p < .01$. (significant)

Table 21

Middle-of-Year Longhand and Typewritten Transcripts
Means and Standard Deviations
for Gregg, Forkner and Century 21 Shorthand Systems
Percent Accuracy at 50, 60 and 70 wpm

Speed of Dictation	Typewritten				Longhand			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>50 wpm</u>								
N	294	426	0	720	235	81	55	371
Mean	63.11%	79.05%		72.54%	64.28%	83.81%	73.78%	69.95%
s.d.	18.46	16.19		18.85	18.34	15.47	18.48	19.47
<u>60 wpm</u>								
N	272	422	0	694	234	81	56	371
Mean	52.01%	68.63%		62.12%	55.17%	74.48%	62.45%	60.48%
s.d.	18.37	18.40		20.09	17.88	19.51	20.34	20.16
<u>70 wpm</u>								
N	266	401	0	667	235	78	56	369
Mean	40.00%	53.74%		48.26%	43.68%	59.80%	49.14%	47.92%
s.d.	15.81	17.14		17.92	14.46	13.57	15.93	16.87

Table 22

Middle-of-Year Longhand and Typewritten Transcripts
Means and Standard Deviations
for Gregg, Forkner and Century 21 Shorthand Systems
Percent of English Errors at 50, 60 and 70 wpm

Speed of Dictation	Typewritten				Longhand			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>50 wpm</u>								
N	294	426	0	720	235	81	55	371
Mean	8.90%	8.30%		8.54%	8.52%	8.35%	11.16%	8.88%
s.d.	4.00	4.29		4.18	4.08	4.13	5.17	4.36
<u>60 wpm</u>								
N	272	422	0	694	234	81	56	371
Mean	10.96%	10.12%		10.45%	9.50%	11.90%	12.90%	10.54%
s.d.	6.27	4.92		5.50	4.30	4.70	5.35	4.75
<u>70 wpm</u>								
N	266	400	0	666	235	78	56	369
Mean	8.22%	7.73%		7.92%	7.13%	7.70%	12.43%	8.05%
s.d.	4.59	3.81		4.14	3.97	3.94	6.10	4.73

Table 23

Middle-of-Year Longhand and Typewritten Transcripts
Means and Standard Deviations
for Gregg, Forkner and Century 21 Shorthand Systems
Transcription Rate at 50, 60 and 70 wpm

Speed of Dictation	Typewritten				Longhand			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>50 wpm</u>								
N	286	407	0	693	231	81	55	367
Mean (wpm)	9.16	12.82		11.31	11.79	10.49	9.39	11.14
s.d.	3.85	10.24		8.42	3.78	3.52	4.06	3.86
<u>60 wpm</u>								
N	264	399	0	663	231	80	55	366
Mean (wpm)	9.14	11.56		10.59	11.04	10.66	8.67	10.60
s.d.	3.60	4.34		4.23	3.25	3.09	3.81	3.40
<u>70 wpm</u>								
N	258	390	0	648	232	76	55	363
Mean (wpm)	8.94	11.21		10.31	11.54	10.55	8.81	10.92
s.d.	3.28	4.32		4.09	3.83	3.25	3.38	3.76

Table 24

Summary of Two-Way Analysis of Variance
Middle-of-Year Shorthand Achievement Scores
by System and by Type of Transcript (Longhand or Typewritten)

Scores Compared	Main Effects				Interaction	
	System		Transcript		System x Transcript	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>						
50 wpm	111.985	0.001	3.799	0.049	1.916	0.163
60 wpm	99.711	0.001	9.542	0.002	0.940	0.999
70 wpm	85.437	0.001	14.554	0.001	0.914	0.999
<u>Percent English Error</u>						
50 wpm	11.105	0.001	0.578	0.999	0.467	0.999
60 wpm	6.858	0.001	0.763	0.999	17.133	0.001
70 wpm	35.928	0.001	5.621	0.017	2.718	0.095
<u>Transcription Rate</u>						
50 wpm	14.835	0.001	3.312	0.065	22.132	0.001
60 wpm	28.874	0.001	10.988	0.001	23.292	0.001
70 wpm	23.732	0.001	27.728	0.001	30.086	0.001

EOY achievement. Sample sizes, means, and standard deviations on the end-of-year dictation tests are presented in Tables 25 - 27, pages 54 - 56, for each shorthand system categorized by type of transcript. Descriptive data for percent of accuracy scores are in Table 25; percent of English error scores, in Table 26; and transcription rate scores, in Table 27. The results of two-way analysis of variance of these scores by shorthand system and by type of transcript are summarized in Table 28, page 57. The findings in these analyses for main effects of the shorthand system parallel the findings presented previously in Tables 16 to 18.

Contrary to expectations, at the end of the year the type of transcript resulted in no main effects or interaction effects on the transcription rate. One significant interaction effect existed between

Table 25

End-of-Year Longhand and Typewritten Transcripts
Means and Standard Deviations
for Gregg, Forkner and Century 21 Shorthand Systems
Percent Accuracy at 60, 70 and 80 wpm

Speed of Dictation	Typewritten				Longhand			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>60 wpm</u>								
N	387	388	31	806	81	0	20	101
Mean	88.89%	91.85%	93.22%	90.48%	92.79%		74.98%	89.26%
s.d.	11.76	9.59	10.22	10.81	9.66		25.27	15.71
<u>70 wpm</u>								
N	386	385	31	802	81	0	19	100
Mean	77.43%	83.04%	82.52%	80.32%	85.89%		68.76%	82.63%
s.d.	16.61	14.19	14.75	15.65	13.60		26.85	18.06
<u>80 wpm</u>								
N	372	375	30	777	81	0	18	99
Mean	65.96%	68.20%	67.18%	67.09%	74.83%		60.81%	72.28%
s.d.	18.18	18.30	14.88	18.14	17.74		28.49	20.67

Table 26

End-of-Year Longhand and Typewritten Transcripts
Means and Standard Deviations
for Gregg, Forkner and Century 21 Shorthand Systems
Percent English Error at 60, 70 and 80 wpm

Speed of Dictation	Typewritten				Longhand			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>60 wpm</u>								
N	387	388	31	806	81	0	20	101
Mean	4.70%	5.16%	3.15%	4.86%	4.10%		4.72%	4.22%
s.d.	2.97	3.05	1.89	3.00	2.20		2.17	2.20
<u>70 wpm</u>								
N	386	385	31	802	81	0	19	100
Mean	6.02%	6.56%	5.02%	6.24%	5.27%		7.28%	5.65%
s.d.	3.32	3.60	2.54	3.45	2.75		4.29	3.18
<u>80 wpm</u>								
N	372	375	30	777	81	0	18	99
Mean	7.89%	8.41%	7.02%	8.11%	7.77%		8.35%	7.87%
s.d.	4.04	4.05	3.95	4.05	3.58		3.74	3.60

Table 27

End-of-Year Longhand and Typewritten Transcripts
Means and Standard Deviations
for Gregg, Forkner and Century 21 Shorthand Systems
Transcription Rate at 60, 70 and 80 wpm

Speed of Dictation	Typewritten				Longhand			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>60 wpm</u>								
N	372	377	31	780	81	0	19	100
Mean (wpm)	14.70	15.43	12.21	14.95	14.26		8.55	13.17
s.d.	4.57	5.09	5.02	4.89	4.15		3.47	4.60
<u>70 wpm</u>								
N	370	373	31	774	81	0	19	100
Mean (wpm)	13.30	14.73	11.76	13.93	13.68		9.46	12.88
s.d.	3.72	4.30	4.72	4.13	3.51		3.51	3.87
<u>80 wpm</u>								
N	363	361	28	752	81	0	18	99
Mean (wpm)	12.10	13.30	10.34	12.61	12.14		8.27	11.44
s.d.	3.48	3.70	3.27	3.65	3.00		2.95	3.33

Table 28

Summary of Two-Way Analysis of Variance
End-of-Year Shorthand Dictation Scores
by System and by Type of Transcript (Longhand or Typewritten)

Scores Compared	Main Effects				Interaction	
	System		Transcript		System x Transcript	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>						
60 wpm	8.033	0.001	0.160	0.999	40.717	0.001
70 wpm	11.895	0.001	8.532	0.004	20.366	0.001
80 wpm	2.379	0.091	10.282	0.002	6.636	0.010
<u>Percent English Error</u>						
60 wpm	5.466	0.005	0.676	0.999	5.755	0.016
70 wpm	3.252	0.038	0.635	0.999	7.882	0.005
80 wpm	2.209	0.108	0.033	0.999	1.268	0.259
<u>Transcription Rate</u>						
60 wpm	16.368	0.001	2.928	0.083	4.574	0.031
70 wpm	22.973	0.001	0.002	0.999	4.506	0.032
80 wpm	23.803	0.001	0.416	0.999	3.368	0.063

shorthand system and type of transcript on the percent of English error at 70 wpm. Gregg shorthand had a higher percent of English error (lower achievement) than Century 21 on the typewritten transcripts, but a lower percent of error (higher achievement) than Century 21 on the longhand transcripts.

For percent of accuracy scores, significant interaction effects existed between shorthand system and transcript type at all three dictation rates. Gregg shorthand had a lower percent of accuracy than Forkner and Century 21 on the typewritten transcripts, but a higher percent of accuracy than Century 21 on the longhand transcripts. There were no Forkner longhand transcripts. Significant main effects by transcript type on the 70 and 80 wpm percent of accuracy scores resulted from the higher scores on the longhand transcripts.

Comparisons of Achievement within Type of Transcript

The previous two-way analysis of achievement by shorthand system and by type of transcript revealed several interactions between these two variables. Comparisons were made ambiguous because all three systems did not have both types of transcripts at each testing session. To get a clearer picture of the relationships between the shorthand systems, comparisons were made using one-way analysis of variance for each type of transcript separately. The following two sections present this analysis first for students with typewritten transcripts and then for students with longhand transcripts.

Typewritten transcripts. On the middle-of-year dictation tests only Gregg and Forkner shorthand students prepared typewritten transcripts. Descriptive data for these dictation tests were presented in Tables 21 - 23, pages 50 to 52, for percent of accuracy, percent of English error, and transcription rate scores. Table 29 summarizes the results of one-way analysis of variance between these two shorthand systems on each achievement score. There were no significant differences in percent of English error scores at any of the dictation speeds for students with typewritten transcripts. For percent of accuracy and transcription rate, significant differences occurred at each speed. In all instances the scores for Forkner students were higher than those for Gregg students.

For the end-of-year dictation tests similar one-way ANOVA comparisons were carried out. At the end of the year, however, typewritten transcripts were available for all three shorthand systems. Descriptive data for these dictation tests were presented in Tables 25 - 27, pages 54 to 56. Table 30, page 60, summarizes the ANOVA results between shorthand systems for students with typewritten transcripts. For percent of accuracy scores, significant differences were found at 60 and 70 wpm. Scores for Forkner students were higher than those for Gregg students, but no difference existed between Gregg and Century 21 students, nor between Forkner and Century 21 students.

For percent of English error scores, significant differences existed at 60 wpm at the 0.01 level; Century 21 students had the lowest percent of error, and thus the highest achievement scores. If the 0.05 level of significance were used at 70 wpm, the Scheffe procedure showed Forkner students to make the highest percent of English errors (lowest achievement) and Century 21 students again the lowest percent of English errors (highest achievement). There were no differences between Gregg and Forkner, nor between Gregg and Century 21 shorthand at 70 wpm.

Transcription rate scores were significantly different at all dictation rates for students with typewritten transcripts at the end of the year. At 60 wpm, Century 21 shorthand had the lowest transcription rate, and no difference was shown between Gregg and Forkner shorthand. At 70 and 80 wpm Forkner shorthand students had the highest transcription rates. At 70 wpm Gregg and Century 21 students did not differ, but at 80 wpm Century 21 was significantly lower than both Gregg and Forkner.

Longhand transcripts. At the middle of the school year students learning all three systems had longhand transcripts. Descriptive data for these students' achievement tests were presented in Tables 21 - 23, pages 50 to 52.

Table 29

Middle-of-Year Shorthand Dictation Tests at 50, 60 and 70 wpm
 Summary of Analysis of Variance for
 Typewritten Transcripts only by
 Gregg and Forkner Shorthand Systems

Scores Compared	ANOVA Summary		Scheffe Location of Differences		
	F Ratio	F Prob.	Highest Achievement	Lowest Achievement	Same Achievement
<u>Percent Accuracy</u>					
50 wpm	150.204	0.000	Forkner	Gregg	
60 wpm	135.058	0.000	Forkner	Gregg	
70 wpm	109.307	0.000	Forkner	Gregg	
<u>Percent English Error</u>					
50 wpm	3.601	0.058			G & F
60 wpm	3.818	0.051			G & F
70 wpm	2.202	0.138			G & F
<u>Transcription Rate</u>					
50 wpm	33.229	0.000	Forkner	Gregg	
60 wpm	56.276	0.000	Forkner	Gregg	
70 wpm	51.368	0.000	Forkner	Gregg	

Table 30

End-of-Year Shorthand Dictation Tests at 60, 70 and 80 wpm
 Summary of Analysis of Variance for
 Typewritten Transcripts only by
 Gregg, Forkner and Century 21 Shorthand Systems

Scores Compared	ANOVA Summary		Scheffe Location of Differences		
	F Ratio	F Prob.	Highest Achievement	Lowest Achievement	Same Achievement
<u>Percent Accuracy</u>					
60 wpm	8.493	0.000	Forkner Forkner		G & C21; F & C21
70 wpm	13.047	0.000			G & C21; F & C21
80 wpm	1.433	0.239			G, F & C21
<u>Percent English Error</u>					
60 wpm	7.574	0.001	Century 21 Century 21	Forkner	F & G
70 wpm	4.399	0.013			G & F; G & C21
80 wpm	2.628	0.073			G, F & C21
<u>Transcription Rate</u>					
60 wpm	7.329	0.001	Forkner Forkner	Century 21 Century 21	G & F
70 wpm	16.149	0.000			G & C21
80 wpm	16.009	0.000			

Table 31 summarizes the results of one-way ANOVA tests between the three systems on percent of accuracy, percent of English error, and transcription rate scores.

Significant differences occurred on all of the variables at each dictation speed. For percent of accuracy scores, Forkner students had the highest scores and Gregg the lowest, except at 80 wpm where Gregg and Century 21 did not differ.

For percent of English errors, Century 21 students had the highest error scores (lowest achievement) at 50 and 70 wpm. At these two speeds Gregg and Forkner students did not differ. At 60 wpm Gregg students had the lowest percent of English errors (highest achievement), and Forkner and Century 21 students did not differ.

At 50 wpm, Gregg students had the highest transcription rate at the middle of the year on longhand transcripts. Forkner and Century 21 did not differ at 50 wpm. At 60 and 70 wpm, however, Century 21 students had the lowest transcription rate and Forkner and Gregg did not differ.

Similar analysis was done on the longhand transcripts at the end of the year. In this case only Gregg and Century 21 shorthand students were included. Descriptive data for these dictation tests were presented in Tables 25 - 27, pages 54 to 56. Table 32, page 63, summarizes the results of the one-way ANOVA between Gregg and Century 21 students on percent of accuracy, percent of English error, and transcription rate scores at each dictation rate.

Gregg shorthand students had significantly higher percent of accuracy scores and transcription rates at all dictation rates. There were no differences at the 0.01 level on percent of English error. If the 0.05 level were used, the Scheffe procedure showed Century 21 students to have a higher percent of English error (lower achievement) at 70 wpm than Gregg students.

Relationships Between Pretests and Shorthand Achievement

The previous comparisons of shorthand achievement measures have been made without reference to the students' scores on the four pretests. If any of these pretests had strong linear relationships with the achievement scores, their use as covariates could increase the efficiency of the analysis of variance used to detect differences in the group means (Kennedy, 1977). The effect of the covariate would be to reduce error variance in the analysis of covariance (ANCOVA) to the extent that the covariate (a pretest score) was related to the criterion measure.

The correlations of each of the four pretest scores, the Revised Byers' Shorthand Aptitude Test, Thorndike 20-Word Vocabulary Test, spelling test, and Cooperative English Test, with middle-of-year shorthand achievement scores are shown in Table 33, page 64. The number of students for whom both a pretest score and an achievement score were available is reported for each correlation coefficient. If a minimum acceptable

Table 31

Middle-of-Year Shorthand Dictation Scores at 50, 60 and 70 wpm
 Summary of Analysis of Variance for
 Longhand Transcripts Only by
 Gregg, Forkner and Century 21 Shorthand Systems

Scores Compared	ANOVA Summary		Scheffe Location of Differences		
	F Ratio	F Prob.	Highest Achievement	Lowest Achievement	Same Achievement
<u>Percent Accuracy</u>					
50 wpm	37.871	0.000	Forkner	Gregg	
60 wpm	32.707	0.000	Forkner	Gregg	G & C21
70 wpm	31.338	0.000	Forkner		
<u>Percent English Error</u>					
50 wpm	9.287	0.000		Century 21	G & F
60 wpm	17.180	0.000	Gregg		F & C21
70 wpm	33.966	0.000		Century 21	G & F
<u>Transcription Rate</u>					
50 wpm	10.609	0.000	Gregg		F & C21
60 wpm	11.370	0.000		Century 21	G & F
70 wpm	12.958	0.000		Century 21	G & F

Table 32

End-of-Year Shorthand Dictation Tests at 60, 70 and 80 wpm
 Summary of Analysis of Variance for
 Longhand Transcripts Only by
 Gregg or Century 21 Shorthand Systems

Scores Compared	ANOVA Summary		Scheffe Location of Differences		
	F Ratio	F Prob.	Highest Achievement	Lowest Achievement	Same Achievement
<u>Percent Accuracy</u>					
60 wpm	25.678	0.000	Gregg	Century 21	
70 wpm	15.940	0.000	Gregg	Century 21	
80 wpm	7.205	0.000	Gregg	Century 21	
<u>Percent English Error</u>					
60 wpm	1.296	0.258			G & C21
70 wpm	6.519	0.012	Gregg	Century 21	
80 wpm	0.378	0.540			G & C21
<u>Transcription Rate</u>					
60 wpm	30.895	0.000	Gregg	Century 21	
70 wpm	22.285	0.000	Gregg	Century 21	
80 wpm	24.585	0.000	Gregg	Century 21	

Table 33

Middle-of-Year Correlation Coefficients for
Pretest Scores and Shorthand Achievement for
Gregg, Forkner and Century 21 Shorthand at 50, 60 and 70 wpm

Shorthand Achievement Score, System, and Speed	Pretest							
	Shorthand Aptitude		Vocabulary		Spelling		English Test	
	N	r	N	r	N	r	N	r
<u>Percent Accuracy</u>								
<u>Gregg</u>								
50 wpm	470	.47	470	.25	463	.40	463	.41
60 wpm	447	.48	450	.28	443	.39	443	.41
70 wpm	443	.48	446	.29	439	.36	439	.42
<u>Forkner</u>								
50 wpm	487	.52	487	.30	487	.39	487	.48
60 wpm	483	.58	483	.36	483	.41	483	.50
70 wpm	460	.60	460	.36	459	.43	459	.50
<u>Century 21</u>								
50 wpm	53	.74	51	.28	51	.39	51	.31
60 wpm	54	.72	51	.26	52	.45	52	.37
70 wpm	54	.74	51	.26	52	.49	52	.45
<u>Percent English Error</u>								
<u>Gregg</u>								
50 wpm	470	-.43	470	-.31	463	-.32	463	-.20
60 wpm	447	-.36	450	-.25	443	-.29	443	-.11
70 wpm	443	-.34	446	-.26	439	-.19	439	-.16
<u>Forkner</u>								
50 wpm	487	-.54	487	-.35	487	-.42	487	-.49
60 wpm	483	-.41	483	-.31	483	-.31	483	-.45
70 wpm	459	-.39	459	-.33	458	-.30	458	-.34
<u>Century 21</u>								
50 wpm	53	-.72	51	-.43	51	-.48	51	-.51
60 wpm	54	-.44	51	-.28	52	-.46	52	-.35
70 wpm	54	-.50	52	-.22	52	-.44	52	-.43
<u>Transcription Rate</u>								
<u>Gregg</u>								
50 wpm	459	.31	459	.17	452	.37	452	.00
60 wpm	438	.34	441	.13	434	.35	434	-.06
70 wpm	434	.30	437	.16	430	.29	430	-.05
<u>Forkner</u>								
50 wpm	468	.14	468	.09	468	.16	468	.15
60 wpm	461	.35	461	.21	459	.36	459	.32
70 wpm	448	.30	448	.15	446	.29	446	.23
<u>Century 21</u>								
50 wpm	53	.53	51	.32	51	.40	51	.22
60 wpm	53	.56	51	.29	51	.37	51	.19
70 wpm	53	.48	51	.24	51	.24	51	.24

Table 34

End-of-Year Correlation Coefficients for
Pretest Scores and Shorthand Achievement for
Gregg, Forkner and Century 21 Shorthand at 60, 70 and 80 wpm

Shorthand Achievement Score, System, and Speed	Pretest							
	Shorthand Aptitude		Vocabulary		Spelling		English Test	
	N	r	N	r	N	r	N	r
<u>Percent Accuracy</u>								
<u>Gregg</u>								
60 wpm	409	.55	410	.51	404	.18	404	.60
70 wpm	408	.46	409	.57	403	-.01	403	.91
80 wpm	393	.40	394	.27	389	.33	389	.31
<u>Forkner</u>								
60 wpm	375	.49	370	.32	372	.36	372	.50
70 wpm	372	.55	367	.34	369	.34	369	.51
80 wpm	362	.56	357	.35	359	.48	359	.45
<u>Century 21</u>								
60 wpm	49	.68	46	.24	48	.31	48	.39
70 wpm	49	.74	56	.27	47	.35	47	.39
80 wpm	47	.72	44	.36	45	.41	45	.47
<u>Percent English Error</u>								
<u>Gregg</u>								
60 wpm	409	-.34	410	-.21	404	-.36	404	-.30
70 wpm	407	-.38	408	-.30	402	-.29	402	-.35
80 wpm	393	-.41	394	-.33	389	-.38	389	-.35
<u>Forkner</u>								
60 wpm	375	-.48	370	-.30	372	-.36	372	-.47
70 wpm	372	-.43	367	-.27	369	-.30	369	-.46
80 wpm	362	-.39	357	-.27	359	-.33	359	-.38
<u>Century 21</u>								
60 wpm	49	-.44	46	-.05	48	-.24	48	-.22
70 wpm	49	-.43	46	-.12	47	-.34	47	-.28
80 wpm	47	-.36	44	-.18	45	-.45	45	-.37
<u>Transcription Rate</u>								
<u>Gregg</u>								
60 wpm	394	.37	398	.19	392	.32	392	.28
70 wpm	391	.38	395	.22	389	.29	389	.30
80 wpm	384	.42	387	.24	383	.27	383	.31
<u>Forkner</u>								
60 wpm	367	.44	361	.23	364	.41	364	.38
70 wpm	363	.45	357	.22	360	.39	360	.37
80 wpm	351	.40	345	.16	348	.35	348	.30
<u>Century 21</u>								
60 wpm	49	.61	46	.35	47	.42	47	.38
70 wpm	49	.58	46	.38	47	.39	47	.35
80 wpm	45	.59	42	.44	44	.41	44	.36

correlation coefficient for predictive validity is judged to be at least $r = .45$ (Guilford, 1965, p. 104), the shorthand aptitude test is the only pretest meeting this requirement.

The correlation coefficients for the end-of-year achievement data are presented in Table 34, page 65. These were similar to those obtained for the middle-of-year data in that the shorthand aptitude test had the highest correlations of the four pretests with shorthand achievement. Correlations were generally higher between the Revised Byers' Shorthand Aptitude Test and the percent of accuracy scores than with the percent of English error and transcription rate scores.

Because of the consistently higher correlations for the Byers' total test score with all of the shorthand achievement measures compared to the other three pretests, the Byers' Shorthand Aptitude Test total score was chosen for use as a covariate in subsequent analysis of the shorthand achievement data.

Comparisons of Shorthand Achievement with Covariate

The relationships between shorthand systems and shorthand achievement when the Revised Byers' Shorthand Aptitude Test scores were taken into account were examined in four ways: 1) two-way analysis of variance was performed using the high or low status of students on the shorthand aptitude test as one of the factors along with shorthand system as the second factor; 2) one-way analysis of covariance was performed using the shorthand aptitude test scores as the covariate and comparing achievement scores between shorthand systems; 3) two-way analysis of covariance was performed using the shorthand aptitude test as the covariate and shorthand system and transcript type as the two main factors in the comparisons of achievement scores; and 4) one-way analysis of covariance was performed within each type of transcript (longhand or typewritten) using shorthand aptitude as the covariate and comparing achievement by shorthand system. The results of these four types of analyses will be briefly discussed.

Comparisons of Achievement with High and Low Aptitude Scores

Two-way analysis of variance was carried out using shorthand system as one factor and a student's status as high or low on the Revised Byers' test as the second factor. Students were categorized as "high" on this aptitude test if their scores fell above the median score and "low" if their scores were below the median. The descriptive data for all of the achievement measures at the MOY and EOY administrations when students were categorized in this manner are included in Appendix G, Tables A-22 to A-27, pages 150 to 155. Summaries of the two-way ANOVA's are also contained in Appendix G, Tables A-28 and A-29, pages 156 to 157.

At both the middle- and end-of-year comparisons the results were the same: students "high" on the shorthand aptitude test were significantly different ($p < 0.001$) from students "low" on this test on all of the achievement variables (percent of accuracy, percent of English error, and transcription rate) at all dictation speeds. As would be expected, the achievement scores were higher for those "high" on the shorthand aptitude test.

The main effects for shorthand system showed significant differences for the three kinds of achievement variables at the same dictation speeds as were also observed on the previous analysis of variance.

There were significant interaction effects on only one comparison: percent of accuracy scores at 60 wpm on the end-of-year tests. Century 21 shorthand students with aptitude scores below the median had the lowest percent of accuracy achievement. However, Century 21 students with aptitude scores above the median had higher achievement on percent of accuracy than Gregg shorthand students with aptitude scores above the median. Forkner shorthand students had the highest percent of accuracy scores at 60 wpm (and 70 wpm) whether their scores were above or below the median on the shorthand aptitude test.

Comparisons of Achievement by Shorthand System

When the total test scores on the Revised Byers' test were included as a covariate in the analysis of covariance, the results for the middle- and end-of-year achievement measures were identical to those reported previously using one-way analysis of variance. These results were shown in Tables 13-18, pages 41 to 47. Appendix H, Tables A-30 and A-31, pages 158 to 159, summarize the results of the two-way ANCOVA.

Comparisons of Achievement by Type of Transcript

Two-way analysis of covariance was carried out using the total Revised Byers' test score as the covariate, shorthand system as one main factor, and type of transcript (longhand or typewritten) as the second main factor. Again the results were substantially the same as those presented for the two-way analysis of variance performed previously and shown in Table 24, page 53 (MOY achievement), and Table 28, page 57 (EOY achievement). On the middle of the year analysis, however, three of the four significant main effects for type of transcript disappeared. The results of the two-way ANCOVA results are available in Appendix H, Tables A-32 and A-33, pages 160 to 161.

Comparisons of Achievement within Type of Transcript

Students making either longhand or typewritten transcripts were considered separately in these last two comparisons of achievement between shorthand system. When one-way analysis of covariance was carried out using the shorthand aptitude test as the covariate, the results were again substantially the same as those reported previously for typewritten transcripts (Tables 29 and 30, pages 59 and 60) and longhand transcripts (Tables 31 and 32, pages 62 and 63) using one-way analysis of variance. For this reason the results of the one-way ANCOVA are included in Appendix H, Tables A-34 and A-35, pages 162 to 163.

Comparisons of Gregg and Forkner Shorthand Only in Schools Teaching Both Systems

Almost half of the students in this study were in high schools teaching both Gregg and Forkner shorthand. While there were no pretest differences for the entire sample between students learning these two systems, perhaps there were differences when students had the option of choosing one of these two shorthand systems. To examine this possibility, pretest scores and achievement scores were compared using one-way analysis of variance.

Descriptive data on the pretests and the ANOVA results are summarized in Table 35. There were no significant differences between these Gregg and Forkner students on any of the four pretest scores.

Descriptive data for the middle-of-year shorthand achievement tests are contained in Table 36, page 70. The ANOVA results summarized in this table show that Gregg and Forkner students continued to differ on the percent of accuracy scores at all dictation rates, on the 50 wpm percent of English error scores, and the 50 wpm transcription rate scores. In each instance the differences favored Forkner shorthand.

Several of these differences disappeared on the end-of-year achievement tests. Table 37, page 71, summarizes the descriptive data and ANOVA results on these variables. No significant differences existed on the percent of accuracy scores. At 60 wpm the percent of English error scores were different with Forkner having the higher percent of error (lower achievement). At the 70 and 80 wpm Forkner shorthand students had significantly higher transcription rates.

Comparisons of Attitude Inventory Scores

Comparisons of two different types were carried out on the shorthand attitude inventory scores collected at three times during the school year. The first was to compare students' attitudes between shorthand systems at the three testing times. The second was to compare students' attitudes as they changed throughout the year within a single shorthand system.

Summaries of the students' responses on the attitude inventory are contained in Appendix I, Tables A-36 to A-43, pages 164 to 167. These eight tables show the proportion of students learning each shorthand system who made each response, "strongly agree" to "strongly disagree," for the eight statements in the inventory on the three test administrations. More condensed summaries of these attitude responses are presented below with the results of the comparisons that were made between shorthand systems and between different test administrations within a shorthand system.

Comparisons Between Shorthand Systems

The attitudes of students learning the three shorthand systems were compared at the beginning of the school year, at the middle of the school

Table 35

Comparisons of Pretests and Shorthand Dictation Tests for
Forkner and Gregg Shorthand Students in
Schools Teaching Both Systems

Pretest Scores Compared	System		ANOVA Summary	
	Forkner	Gregg	F Ratio	F Prob
<u>Revised Byers' Aptitude</u>				
N	270	313		
Total Score (105)				
$\bar{X}$	58.74	59.88	0.878	0.349
s.d.	16.50	12.76		
<u>20-Word Vocabulary (20)</u>				
N	277	317		
$\bar{X}$	9.62	9.84	1.164	0.281
s.d.	2.57	2.43		
<u>Spelling (30)</u>				
N	264	299		
$\bar{X}$	11.05	11.63	3.003	0.084
s.d.	3.73	4.14		
<u>Cooperative English Test</u>				
N	264	299		
Total Score (100)				
$\bar{X}$	62.92	64.59	4.275	0.039
s.d.	10.37	8.82		

year, and at the end of the year. Chi-square analysis was used to compare the frequency of the responses on a single item for the three shorthand systems.

Beginning-of-year comparisons. Table 38, page 72, summarizes the responses of students learning each shorthand system for the eight attitude statements completed at the beginning of the school year. A weighted average score was computed for each statement using weights from 5 to 1 for "strongly agree" to "strongly disagree." These item average weights were not used in the Chi-square analysis; they are presented here solely as a concise means of summarizing the responses. They provide a means

Table 36

Comparisons of Middle-of-Year Shorthand Dictation Tests for
Forkner and Gregg Shorthand Students in
Schools Teaching Both Systems

Shorthand Dictation Test Scores Compared	System		ANOVA Summary	
	Forkner	Gregg	F Ratio	F Prob
<u>Percent of Accuracy</u>				
50 wpm				
N	238	313		
$\bar{X}$	79.84	65.47	86.737	0.000
s.d.	17.16	18.49		
60 wpm				
N	236	291		
$\bar{X}$	69.11	55.04	70.112	0.000
s.d.	19.80	18.67		
70 wpm				
N	212	285		
$\bar{X}$	54.26	42.03	63.16	0.000
s.d.	18.19	15.98		
<u>Percent of English Error</u>				
50 wpm				
N	238	313		
$\bar{X}$	7.93	8.91	8.106	0.005
s.d.	4.19	3.82		
60 wpm				
N	236	291		
$\bar{X}$	10.34	10.78	0.935	0.334
s.d.	4.76	5.57		
70 wpm				
N	212	285		
$\bar{X}$	7.59	8.01	1.262	0.262
s.d.	4.07	4.18		
<u>Transcription Rate</u>				
50 wpm				
N	222	305		
$\bar{X}$ (wpm)	11.22	9.80	17.399	0.000
s.d.	4.09	3.66		
60 wpm				
N	216	284		
$\bar{X}$ (wpm)	10.73	9.86	6.306	0.012
s.d.	4.01	3.66		
70 wpm				
N	204	280		
$\bar{X}$ (wpm)	10.44	9.68	5.485	0.020
s.d.	3.59	3.44		

Table 37

Comparisons of End-of-Year Shorthand Dictation Tests for
Forkner and Gregg Shorthand Students in
Schools Teaching Both Systems

Shorthand Dictation Test Scores Compared	System		ANOVA Summary	
	Forkner	Gregg	F Ratio	F Prob
<u>Percent of Accuracy</u>				
<u>60 wpm</u>				
N	158	288		
$\bar{X}$	91.45	90.56	0.722	0.396
s.d.	10.18	10.85		
<u>70 wpm</u>				
N	155	287		
$\bar{X}$	81.27	79.41	1.348	0.246
s.d.	15.59	16.31		
<u>80 wpm</u>				
N	148	274		
$\bar{X}$	66.33	67.65	0.476	0.491
s.d.	19.38	18.39		
<u>Percent of English Error</u>				
<u>60 wpm</u>				
N	158	288		
$\bar{X}$	5.38	4.69	4.610	0.032
s.d.	3.48	3.08		
<u>70 wpm</u>				
N	155	287		
$\bar{X}$	7.07	6.00	8.390	0.004
s.d.	4.26	3.40		
<u>80 wpm</u>				
N	148	274		
$\bar{X}$	8.30	7.90	0.839	0.360
s.d.	4.30	4.15		
<u>Transcription Rate</u>				
<u>60 wpm</u>				
N	147	273		
$\bar{X}$ (wpm)	15.47	14.77	2.032	0.155
s.d.	5.05	4.66		
<u>70 wpm</u>				
N	144	271		
$\bar{X}$ (wpm)	14.84	13.44	10.405	0.001
s.d.	4.70	3.90		
<u>80 wpm</u>				
N	136	265		
$\bar{X}$ (wpm)	13.31	12.10	10.055	0.002
s.d.	3.84	3.46		

Table 38

Attitude Inventory
Weighted Average Statement Scores for
Beginning-of-Year Administration Comparison of
Gregg, Forkner and Century 21 Shorthand Students

Statement	Beginning-of-Year Weighted Average			x ²	
	Gregg N = 564	Forkner N = 576	Century 21 N = 72	Value	Prob
1- Easy to learn	2.77	3.37	3.56	136.13	0.001
2- Effort and practice	4.49	4.22	4.46	48.08	0.001
3- Fun	3.69	3.77	3.96	17.81	0.010
4- Shorthand skill as office employee	3.57	3.23	3.67	48.25	0.001
5- Continue education	3.67	3.81	3.86	8.21	0.500
6- Office job	3.36	3.03	3.32	49.10	0.001
7- Succeed	4.03	4.00	4.13	11.03	0.100
8- Interest	4.15	4.15	4.35	17.10	0.010

for observing the differences between the systems which were detected by the Chi-square analysis using frequencies of responses in each response category.

At the beginning of the year significant differences at $p < 0.01$ existed on six of the eight attitude statements. Gregg students were less likely than Forkner or Century 21 students to think that shorthand was easy to learn, and they were more likely to think learning shorthand required much effort and practice. Century 21 students were more likely than Forkner or Gregg students to think learning shorthand was fun and to be interested in learning the subject. Forkner students were less likely than Gregg and Century 21 students to be planning to use shorthand as an office employee. Students in all shorthand systems were more certain of continuing their education after high school than of obtaining office jobs.

Middle-of-year comparisons. Table 39 summarizes the attitude responses of students to the same eight statements at the middle of the school year. Chi-square analysis revealed that significant differences existed on six of the eight statements, four of these being the same as at the beginning of the year. The additional differences showed that while most students generally agreed that they planned to continue their education after high

Table 39

Attitude Inventory
Weighted Average Statement Scores for
Middle-of-Year Administration Comparison of
Gregg, Forkner and Century 21 Shorthand Students

Statement	Middle-of-Year Weighted Average			χ^2	
	<u>Gregg</u> N = 451	<u>Forkner</u> N = 489	<u>Century 21</u> N = 54	Value	Prob
1- Easy to learn	3.17	3.45	3.80	42.33	0.001
2- Effort and practice	4.58	4.35	4.46	31.71	0.001
3- Fun	3.56	3.42	3.91	24.59	0.010
4- Shorthand skill as office employee	3.28	2.96	3.44	33.86	0.001
5- Continue education	3.71	3.82	3.89	20.33	0.010
6- Office job	3.20	2.93	3.20	25.11	0.100
7- Succeed	3.86	3.75	4.26	35.57	0.001
8- Interest	3.88	3.70	4.20	20.06	0.050

school, this agreement was stronger for Century 21 students than for Gregg students. Century 21 students also agree more strongly that they thought they could succeed in learning shorthand.

End-of-year comparisons. At the end of the school year those students who were still in the shorthand classes had more similar attitudes than had been expressed at either the beginning or middle of the year. Chi-square analysis, as summarized in Table 40, page 74, revealed significant differences between the shorthand systems on only one statement. Gregg shorthand students were less likely to agree than were Forkner or Century 21 students that shorthand was easy to learn. Most students learning all three of the systems agreed that learning shorthand required much effort and practice.

At the end of the school year most of the students were still undecided or did not plan to use their shorthand skill as office employees. More than 60 percent of the students learning each system agreed that they planned to continue their education after high school.

Table 40

Attitude Inventory
Weighted Average Statement Scores for
End-of-Year Administration Comparison of
Gregg, Forkner and Century 21 Shorthand Students

Statement	End-of-Year Weighted Average			χ^2	
	<u>Gregg</u> N = 391	<u>Forkner</u> N = 353	<u>Century 21</u> N = 50	Value	Prob
1- Easy to learn	3.46	3.79	3.88	31.17	0.001
2- Effort and practice	4.50	4.33	4.40	15.74	0.050
3- Fun	3.69	3.57	3.60	13.80	0.100
4- Shorthand skill as office employee	3.32	3.22	3.14	7.42	0.500
5- Continue education	3.90	3.93	3.90	3.16	0.950
6- Office job	3.26	3.24	3.12	7.71	0.500
7- Succeed	3.94	3.93	4.04	4.54	0.900
8- Interest	3.88	3.78	3.88	5.69	0.800

Comparisons Within Shorthand Systems Between Testing Times

The purpose of making comparisons within each shorthand system was to determine whether students' attitudes toward learning shorthand changed as the school year progressed. Because the same students were being compared at each testing time, Chi-square analysis could not be used; the data were not independent. Mann-Whitney U analysis was used to compare the frequencies of the responses to each statement at different testing times. For each shorthand system separately, the attitudes expressed at the beginning of the year were compared with those at the middle of the year. The attitudes expressed at the middle of the year were then compared with attitudes at the end of the school year.

It should be recognized that in all instances significant changes in attitude could be resulting from two different situations: either there were actual changes in the attitudes students held as the year progressed, or those students who had not dropped out by the second and third testing sessions possessed different attitudes as a whole from those who comprised the earlier larger groups. Because the responses were anonymous, the sources of attitude changes could not be determined.

Table 41

Attitude Inventory
Weighted Average Statement Scores for
Gregg Shorthand Only
Comparison of Beginning-, Middle- and End-of-Year Administrations

Statement	Weighted Average			Mann-Whitney U Tests			
	BOY	MOY	EOY	BOY-MOY		MOY-EOY	
	N = 564	N = 451	N = 391	Z Value	Z Prob	Z Value	Z Prob
1- Easy to learn	2.77	3.17	3.46	-6.31	0.001	-4.16	0.001
2- Effort and practice	4.49	4.58	4.50	-2.01	0.025	-0.65	0.360
3- Fun	3.69	3.56	3.69	-2.39	0.010	-1.85	0.035
4- Shorthand skill as office employee	3.57	3.28	3.32	-4.85	0.001	-0.72	0.240
5- Continue education	3.67	3.71	3.90	-0.83	0.210	-2.64	0.005
6- Office job	3.36	3.20	3.26	-2.42	0.010	-0.89	0.190
7- Succeed	4.03	3.86	3.94	-1.70	0.045	-1.82	0.035
8- Interest	4.15	3.88	3.88	-5.04	0.001	-0.01	0.500

Gregg shorthand attitude changes. The weighted average scores for each of the eight statements in the attitude inventory for Gregg shorthand students have been summarized in Table 41. The results of the Mann-Whitney U analysis are also presented for the two pairs of comparisons: beginning-of-year responses with middle-of-year responses, and middle-of-year responses with end-of-year responses.

On the first comparison, Gregg students changed significantly on five of the eight statements. They were more likely at the middle of the year to think that shorthand was easy to learn, but they were less likely to think it was fun and to be interested in learning the subject. Most students, however, still agreed that shorthand was fun and were interested in learning the subject. At the middle of the year Gregg students were less likely to plan to use their shorthand skill as office employees than they were at the beginning of the year.

From the middle to the end of the school year fewer changes in attitude occurred. Significant differences were found on only two of the eight statements. Gregg students continued to change to more agreement that shorthand was easy to learn and had the highest average item score on this statement at the end of the school year. Students did not change

Table 42

Attitude Inventory
Weighted Average Statement Scores for
Forkner Shorthand Only
Comparison of Beginning-, Middle- and End-of-Year Administrations

Statement	Weighted Average			Mann-Whitney U Tests			
	BOY	MOY	EOY	BOY-MOY		MOY-EOY	
	N = 576	N = 489	N = 353	Z Value	Z Prob	Z Value	Z Prob
1- Easy to learn	3.37	3.45	3.79	-2.63	0.005	-4.82	0.001
2- Effort and practice	4.22	4.35	4.33	-2.89	0.001	-0.25	0.400
3- Fun	3.77	3.42	3.57	-6.36	0.001	-2.45	0.010
4- Shorthand skill as office employee	3.23	2.96	3.22	-4.38	0.001	-3.57	0.001
5- Continue education	3.81	3.82	3.93	-0.48	0.320	-1.48	0.070
6- Office job	3.03	2.93	3.24	-1.48	0.070	-4.11	0.001
7- Succeed	4.00	3.75	3.93	-3.96	0.001	-2.86	0.010
8- Interest	4.15	3.70	3.78	-8.42	0.001	-1.19	0.120

in their attitude that learning shorthand required much effort and practice. They were also still largely undecided about whether they wanted to use their skill as office employees. More of the students at the end of the year than at the middle agreed that they planned to continue their education after high school.

Forkner shorthand attitude changes. More changes in attitude were observed for Forkner shorthand than for Gregg shorthand between the three testing sessions. As summarized in Table 42, Forkner students changed on six of the eight statements from the beginning to the middle of the school year. At the middle of the year more students thought shorthand was easy to learn, but more also agreed that it required much effort and practice. There was not as strong agreement at the middle of the year as at the beginning that shorthand was fun, that they were interested in the subject, or that they could succeed in learning the subject. Most students still agreed with these statements, however. At the middle of the year a larger proportion of students disagreed that they planned to use their shorthand skill as office employees.

Table 43

Attitude Inventory
Weighted Average Statement Scores for
Century 21 Shorthand Only
Comparison of Beginning-, Middle- and End-of-Year Administrations

Statement	Weighted Average			Mann-Whitney U Tests			
	BOY	MOY	EOY	BOY-MOY		MOY-EOY	
	N = 72	N = 54	N = 50	Z Value	Z Prob	Z Value	Z Prob
1- Easy to learn	3.56	3.80	3.88	-1.68	0.050	-0.54	0.300
2- Effort and practice	4.46	4.46	4.40	-0.15	0.440	-0.47	0.320
3- Fun	3.96	3.91	3.60	-0.25	0.400	-1.50	0.070
4- Shorthand skill as office employee	3.67	3.44	3.14	-1.28	0.100	-1.54	0.070
5- Continue education	3.86	3.89	3.90	-0.58	0.280	-0.25	0.400
6- Office job	3.32	3.20	3.12	-0.32	0.380	-0.45	0.330
7- Succeed	4.13	4.26	4.04	-1.26	0.110	-1.39	0.090
8- Interest	4.35	4.20	3.88	-1.08	0.140	-1.72	0.045

From the middle to the end of the school year, attitudes changed on five of the eight statements. Students were again more likely to agree that learning shorthand was easy; in fact, this average weight was higher at the end of the year than at the beginning. The proportion of students agreeing that shorthand was fun to learn and that they could succeed also increased. Those students who were present at the end of the year also expressed more agreement than at the middle that they planned to use their skill as office employees.

Century 21 shorthand attitude changes. Comparisons of the attitudes of Century 21 shorthand students between the beginning and middle of the year and between the middle and end of the school year showed no changes. Table 43 summarizes the average item response weights and the results of the Mann-Whitney U comparisons. These students were consistent in agreeing that shorthand was easy to learn, but that it also required much effort and practice. They thought it was fun to learn, were interested in learning the subject, and thought they could succeed. Most students were undecided or disagreed that they wanted to use shorthand as office employees, however. There was more agreement to the statement they planned to continue their education after high school.

Summary

This chapter has included a review of the findings on shorthand pre-test and achievement test comparisons for 1,317 students learning either Gregg, Forkner or Century 21 shorthand in 20 Twin Cities area high schools. Descriptive data were presented for four pretests and dictation tests at 50, 60 and 70 wpm administered at the middle of the school year and 60, 70 and 80 wpm at the end of the school year. Scores on the achievement tests were percent of accuracy, percent of English error, and transcription rate. Analysis of variance was performed to compare these achievement scores between the shorthand systems as complete groups and between the shorthand systems when the type of transcript was considered, either long-hand or typewritten.

Correlation of the pretest scores showed that the total score on the Revised Byers' Shorthand Aptitude test had the highest relationship with shorthand achievement scores. For this reason, this total score was used as a covariate in analysis of covariance to compare shorthand achievement scores when students' aptitude scores were taken into account. Findings on these ANCOVA tests were substantially the same as those revealed by the analysis of variance tests. The results of the several ANOVA and ANCOVA tests have been summarized in the following tables.

Two comparisons were made between all of the students learning each shorthand system at the middle of the year: one-way ANOVA and one-way ANCOVA. There were also two comparisons between students learning the three shorthand systems who had longhand transcripts only at the middle of the year: one-way ANOVA and one-way ANCOVA. Since there were three scores for each type of measure (percent of accuracy, percent of English error, and transcription rate), one at each dictation rate, there were 12 occasions for each measure on which a shorthand system could have been shown to have the highest or lowest achievement. The same was true at the end of the year, except that for the type of transcript comparisons students from all three shorthand systems were compared for typewritten transcripts instead of longhand. Again there were 12 occasions on which a shorthand system could be identified as having the highest or lowest achievement.

Table 44 shows the summary results when all three shorthand systems were included in the comparisons. At the middle of the year, Forkner shorthand consistently had the highest percent of accuracy achievement and on six occasions had the highest transcription rate. On two occasions Gregg shorthand had the highest achievement on the percent of English error measure and on two occasions the highest transcription rate. Gregg also had the lowest achievement on percent of accuracy on 10 occasions. Century 21 shorthand students were not shown on any comparison to have the highest achievement. On 10 occasions Century 21 students had the lowest achievement on percent of English error and on eight occasions the lowest transcription rate.

On the end-of-year tests, Table 44 shows Forkner shorthand to have the highest achievement on eight occasions for percent of accuracy scores and on 10 occasions for the transcription rate scores. Forkner students also had the lowest achievement on two occasions for the percent of

Table 44

Summary of Shorthand Achievement Comparisons on
One-Way ANOVA and One-Way ANCOVA
Including Gregg, Forkner and Century 21 Shorthand
Middle-of-Year and End-of-Year Achievement

Score	Highest Achievement Score			Lowest Achievement Score		
	G	F	C21	G	F	C21
<u>Middle of Year</u>						
Percent Accuracy		12		10		
Percent English Error	2					10
Transcription Rate	2	6				8
<u>End of Year</u>						
Percent Accuracy		8				
Percent English Error			2		2	
Transcription Rate		10				10

Table 45

Summary of Shorthand Achievement Comparisons on
One-Way ANOVA and One-Way ANCOVA
Including Gregg and Forkner Shorthand Only
Middle-of-Year and End-of-Year Achievement

Score	Higher Achievement Score		Lower Achievement Score	
	G	F	G	F
<u>Middle of Year</u>				
Percent Accuracy		9	9	
Percent English Error	2	1	1	2
Transcription Rate		7	7	
<u>End of Year</u>				
Percent Accuracy				
Percent English Error	1			1
Transcription Rate		2	2	

English error scores. Century 21 shorthand had the highest achievement twice on the percent of English error measures, but were the lowest group on ten occasions on transcription rate scores.

There were three comparisons which included only Gregg and Forkner shorthand, one-way ANOVA and one-way ANCOVA at the middle of the year on typewritten transcripts only, and one-way ANOVA of students in schools teaching both Gregg and Forkner shorthand. There were, therefore, a total of nine comparisons at the middle of the year on which either system could be shown higher or lower on each type of achievement measure. Table 45, page 79, shows that at the middle of the year Forkner students were consistently higher on the percent of accuracy scores and higher eight times on the transcription rate scores. Three of the nine comparisons on percent of English errors showed significant differences; on two of these Gregg had the higher achievement, and on one occasion Forkner had the higher achievement.

At the end of the year Gregg and Forkner shorthand were compared in schools teaching both systems. Forkner was found two out of the three times to be higher on transcription rate scores. On one occasion Gregg was higher on the percent of English error scores. No differences resulted on percent of accuracy scores.

The comparisons involving Gregg and Century 21 shorthand only were at the end of the school year for longhand transcripts. A total of six comparisons on each of the three achievement measures were carried out using one-way ANOVA and one-way ANCOVA. As shown in Table 46, on five of the six comparisons Gregg shorthand students had higher percent of accuracy scores and transcription rates. There were no significant differences for the percent of English error scores. Only one Century 21 class (N=19) was included in these comparisons.

Students learning the three shorthand systems differed more in their attitudes toward learning shorthand at the beginning of the year than at the end of the year. At the beginning of the year there were differences between systems in the degree of agreement about plans to use shorthand skill as office employees. At the end of the year most of the students learning each system were undecided or disagreed that they planned to use shorthand as office employees.

At the end of the year most students agreed that shorthand was easy to learn, but Forkner and Century 21 students agreed more strongly with this statement. Students learning all systems agreed that learning shorthand required much effort and practice. There was also agreement by the majority of students learning each system, particularly at the end of the school year, that they planned to continue their education after high school.

Table 46

Summary of Shorthand Achievement Comparisons on
 One-Way ANOVA and One-Way ANCOVA
 Including Gregg and Century 21 Shorthand Only
 End-of-Year Achievement Only on Longhand Transcripts

Score	Higher Achievement Score		Lower Achievement Score	
	G	C21	G	C21
<u>End of Year</u>				
Percent of Accuracy	5			5
Percent English Error				
Transcription Rate	5			5

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

The following are the conclusions which were drawn from the findings of this study and the recommendations for instruction and further research.

Conclusions

Based on the findings of this study, the following conclusions can be drawn:

1) Students learning Gregg, Forkner, or Century 21 shorthand did not differ in their initial verbal abilities or shorthand aptitude as measured by the pretests used in this study. This was true even in those schools in which students could choose between Gregg and Forkner shorthand.

2) Since students learning all three shorthand systems could, on the average, accurately transcribe only about two-thirds of their shorthand notes from 80 wpm dictation at the end of the school year, the average student probably could not produce a mailable transcript from the 80 wpm dictation. This conclusion reconfirms the findings of several previous studies.

3) The percent of students who stayed in the shorthand classes throughout the school year did not differ for Gregg, Forkner, and Century 21 shorthand. All three systems retained approximately 70 percent of the students who began the course.

4) Students withdrawing from shorthand classes before the end of the school year had significantly lower scores on all of the pretests than students not withdrawing from the courses.

5) On the average, students who scored above the median on the Revised Byers' Shorthand Aptitude Test attained significantly higher shorthand achievement on all criterion variables than students who scored below the median on this shorthand aptitude test.

6) Forkner students had significantly higher or lower scores than Gregg and Century 21 shorthand students on the following achievement measures:

- a) Percent of Accuracy: When students with longhand or typewritten transcripts were combined and also when they were considered separately, Forkner students had the highest percent of accuracy scores at all dictation speeds at the middle of the school year. When all three systems were compared at the end of the year, for all students combined or for only those with typewritten transcripts, Forkner students had significantly higher percent of accuracy scores at all dictation speeds except 80 wpm. No differences existed between the three systems at 80 wpm, the highest speed dictated.

- b) Percent of English Error: Forkner students had significantly lower achievement than Gregg and Century 21 students at the end of the school year on percent of English error scores at 60 wpm. This was also true at the end of the year at 70 wpm when only Forkner and Gregg students were considered in schools teaching both systems.
- c) Transcription Rate: When students with longhand or typewritten transcripts were combined at both the middle and end of the school year, Forkner students had significantly higher transcription rates than Gregg and Century 21 students at all dictation speeds. This was also true at the middle of the year when typewritten transcripts were considered separately. When typewritten transcripts were considered separately at the end of the year, Forkner had the highest transcription rates at 70 and 80 wpm.

7) Gregg shorthand students had significantly higher or lower scores than Forkner and Century 21 shorthand students on the following achievement measures:

- a) Percent of Accuracy: At the middle of the year Gregg students had the lowest percent of accuracy scores on 10 of 12 comparisons. When only Gregg and Forkner shorthand were compared at the middle of the year in schools teaching both systems, Gregg students had lower percent of accuracy scores on all nine comparisons. At the end of the year when only Gregg and Forkner were compared in schools teaching both systems, there was no difference on percent of accuracy scores at any of the dictation speeds.

At the end of the school year, Gregg students had higher achievement than Century 21 students when only these two systems were compared for students with longhand transcripts.

- b) Percent of English Error: When students with longhand transcripts were considered separately at the middle of the year, Gregg students had the highest achievement at 60 wpm on percent of English error scores.
- c) Transcription Rates: When students with longhand transcripts were considered separately at the middle of the school year, Gregg students had the highest transcription rates at 50 wpm.

8) Century 21 shorthand students had significantly higher or lower scores than Forkner and Gregg shorthand students on the following achievement measures:

- a) Percent of Accuracy: Century 21 students had the lower percent of accuracy scores only when compared with Gregg students at the end of the school year on longhand transcripts.
- b) Percent of English Error: Century 21 students had the lowest percent of English error scores on 10 of 12 comparisons at the middle of the year compared with Forkner and Gregg students. At the end of the school year Century 21 students had the highest achievement on this measure on two of 12 comparisons.

- c) Transcription Rate: Century 21 students had the lowest transcription rates at the middle of the year on eight of 12 comparisons and at the end of the year on 10 of 12 comparisons.

Because only two schools and six percent of the students in this study were included in the Century 21 sample, these conclusions may not represent typical achievement in Century 21 shorthand.

9) Because the differences in the percent of English error scores were not consistent for any of the three systems, and because these scores were the least reliable of the three measures used, the findings with regard to percent of English error scores were considered to be inconclusive. None of the three shorthand systems could be said to have consistently affected achievement on English style elements as measured in this study.

10) At the beginning of the school year, students taking Forkner or Century 21 shorthand were more likely to think shorthand was easy to learn than were students taking Gregg shorthand. This may mean that a new shorthand system or an alphabetic shorthand system was generally "promoted" as easy to learn. At the end of the year, however, students remaining in the courses agreed that shorthand was easy to learn, and they agreed more strongly if they had learned Forkner or Century 21 shorthand.

11) Most students learning any of the three shorthand systems were undecided or disagreed that they planned to use their shorthand skill as office employees. It cannot, therefore, be assumed that most students enrolling in shorthand have made a commitment to acquire a vocational skill.

12) Most students learning any of the three shorthand systems planned to continue their education after high school.

Recommendations

The following recommendations for instruction and for further research are made on the basis of the previous conclusions:

Instruction

1) If only one semester of shorthand is to be offered for personal use, Forkner shorthand should be taught. Achievement was significantly higher on percent of accuracy and transcription rate scores at the middle of the school year for Forkner shorthand students compared with Gregg and Century 21 shorthand students.

2) Since on percent of accuracy and transcription rate scores Forkner students were higher than Gregg students on 75 percent of the comparisons, the same as Gregg on 22 percent, and lower than Gregg on three percent of the comparisons, Forkner shorthand should be available to students for at least one year at the high school level.

3) Since students learning any of the three shorthand systems did not achieve average percent of accuracy scores that would be likely to result in mailable letters on the 80 wpm dictation, one year of shorthand should not be considered sufficient for most high school students for the development of minimum vocational skill levels regardless of the system.

4) The Revised Byers' Shorthand Aptitude Test should be administered to students prior to enrolling in shorthand classes so that additional counseling can be made available to students with low scores on this test. Since low-aptitude students were more likely to withdraw from shorthand or to achieve lower shorthand skill levels than students with higher scores, additional student ability and interest indicators should be examined for low-aptitude students to better judge the course options available.

5) Because a minority of beginning shorthand students agreed that they planned to use their shorthand skills as office employees, shorthand teachers should not assume that students are aware of the employment opportunities available if they possess shorthand skill. Class time should be spent discussing career opportunities as well as personal-use applications for persons with shorthand skill.

Further Research

1) Because the percent of English error scores were less reliable than the percent of accuracy and transcription rate scores, further reliability investigations should be carried out on longer dictation tests in which various English style elements are included. Reliability might also be improved by separating spelling and typewriting errors from other kinds of English errors, since typographical errors are probably the least stable element in these scores and are not English errors.

2) Second-year shorthand achievement data should be collected to compare these three and other shorthand systems.¹

3) The students involved in this study should be followed up after their high school graduation to determine the uses made of their shorthand skills.

4) Comparisons should be made of different shorthand systems when teaching methodology is controlled.

5) Century 21 shorthand should be compared with Gregg, Forkner, and other shorthand systems using a larger sample of Century 21 students than was available in this study.

6) The accuracy of the shorthand notes obtained from Gregg, Forkner, and Century 21 shorthand students in this study should be compared with the accuracy of the transcripts.²

¹Second-year Forkner and Gregg shorthand achievement data have been collected for some of the students included in this study who continued their high school shorthand instruction.

²This study is now being carried out.

BIBLIOGRAPHY

- Balsley, I. W. Dictation tests. Lubbock, Texas: National Collegiate Association of Secretaries, Texas Tech University, 1973.
- Barr, J. E. An analysis, classification and synthesis of research findings in shorthand and transcription, 1957-1967. (Doctoral dissertation, University of Oklahoma) Ann Arbor, MI: University Microfilms, 1971, No. 71-1478.
- Bellucci, C. A study to determine first semester standards in Diamond Jubilee shorthand for Hunter College students. Masters thesis, Hunter College at New York City, 1964.
- Buros, O. K. (Ed.) The sixth mental measurements yearbook. Highland Park, NJ: Gryphone Press, 1965.
- Busch, F. M., Jr. The relevance of shorthand teaching practices to the development of recording skill. (Doctoral dissertation, Indiana University) Ann Arbor, MI: University Microfilms, 1974, No. 75-9014.
- Casady, M. J. Job satisfaction of magnetic typewriting operators in word processing. (Doctoral dissertation, University of Minnesota) Ann Arbor, MI: University Microfilms, 1973, No. 74-00764.
- Christensen, E. L. and Bell, R. D. Century 21 shorthand, theory and practice, book 1. Cincinnati: South-Western Publishing Co., 1974.
- Cowley, B. Terminal writing speeds achieved by first-year shorthand students in selected Utah high schools. Masters thesis, Brigham Young University, 1976.
- Crank, F. L., Crank, D. H., and Harrahan, M. F. Why don't beginning shorthand students go on? The Balance Sheet, 53:153-156, December, 1971-January, 1972.
- Douglas, L. V., Blanford, J. T., and Anderson, R. I. Teaching business subjects (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall, 1973.
- Forkner, H. L., Brown, F. A., and Forkner, H. L., Jr. Forkner shorthand (4th ed.). Ridgewood, NJ: Forkner Publishing Company, 1968.
- Forkner, H. L. and DeYoung, R. C. A historical development of shorthand. In R. B. Wooschlager and E. E. Harris (Eds.) Business education yesterday, today, and tomorrow. National Business Education Yearbook (No. 14). Reston, VA: National Business Education Association, 1976.
- Frink, I. A comprehensive analysis and synthesis of research findings and thought pertaining to shorthand and transcription, 1946-57. (Doctoral dissertation, Indiana University) Ann Arbor, MI: University Microfilms, 1961, No. 61-03206.
- Gertler, D. B. and Barker, L. A. Patterns of course offerings and enrollments in public secondary schools, 1970-71. DHEW Pub. No. (OE) 73-11400. Washington, DC: U. S. Dept. of Health, Education, and Welfare, Office of Education, National Center for Educational Statistics, 1973.

- Gilmore, M. C. A comparison of a traditional approach and a programmed approach to developing shorthand skill in inner-city schools. (Doctoral dissertation, University of Minnesota) Ann Arbor, MI: University Microfilms, 1976, No. 76-27891.
- Gregg, J. R., Leslie, L. A., and Zoubek, C. E. Gregg shorthand, Diamond Jubilee series (2nd ed.). New York: Gregg Division, McGraw-Hill Book Company, 1971.
- Guilford, J. P. Fundamental statistics in psychology and education (4th ed.). New York: McGraw-Hill Book Company, 1965.
- Hadfield, A. A comparison of the learning achievement in Gregg (DJ) symbol shorthand and selected abbreviated longhand systems. (Doctoral dissertation, Utah State University), 1975.
- Harper, J. An evaluation of the effectiveness of Carter briefhand and Gregg shorthand (simplified) at the secondary level. (Doctoral dissertation, Colorado State College) Ann Arbor, MI: University Microfilms, 1964, No. 65-00232.
- Harris, C. W. Evaluation of Cooperative English Tests. Fourth mental measurements yearbook. Highland Park, NJ: Gryphon Press, 1953.
- Horlacher, F. K. A comparison of the learning progress in Stenoscript alphabetic shorthand and Gregg (DJ) symbol shorthand after two semesters of instruction. (Doctoral dissertation, Arizona State University) Ann Arbor, MI: University Microfilms, 1969; No. 70-04859.
- Kennedy, J. J. The use and misuse of analysis of covariance. NABTE Review, 1977, pp. 10-11.
- Lambrecht, J. J. The validation of a revised edition of Byers' shorthand aptitude test. (Doctoral dissertation, University of Wisconsin) Ann Arbor, MI: University Microfilms, 1971, No. 71-28348.
- McCullough, C. M. and Flanagan, J. C. The validity of the machine-scoreable Cooperative English Test. The Journal of Experimental Education, 1939, pp. 229-232.
- Miner, J. B. On the use of a short vocabulary test to measure general intelligence. Journal of Educational Psychology, 52:157-160, 1961.
- Nanassy, L. C., Malsbary, D. R., and Tonne, H. A. Principles and trends in business education. Indianapolis: The Bobbs-Merrill Company, Inc., 1977.
- Olinzock, A. A. An analysis of business dictation. (Doctoral dissertation, University of Pittsburgh) Ann Arbor, MI: University Microfilms, 1976, No. 76-26229.
- Oross, G. A. Student performance in Gregg, Forkner, and Century 21 shorthand in selected Florida high schools in 1975-76. Collier County, Florida: Mimeograph report from the Director of Vocational, Technical and Adult Education, 1976.

- Perry, D. J. The 500 most frequently used word combinations and the 5,000 most frequently occurring words in business letters. Research and Service Project No. 1. Provo, Utah: Alpha Omega Chapter of Delta Pi Epsilon, Brigham Young University, 1970.
- Pullis, J. M. A test of the validity of syllabic intensity and percent high-frequency words as a measure of difficulty of published shorthand materials. Business Education Forum 31:55, October, 1976.
- Pullis, J. M. and Nickerson, I. Determining dictation difficulty: a measurement dilemma. Century 21 Reporter, Fall 1975, pp. 11, 13-14.
- Smith, E. R. A comparison of the learning difficulty of Forkner alphabetic shorthand and Gregg (DJ) shorthand. (Doctoral dissertation, Ohio State University) Ann Arbor, MI: University Microfilms, 1966, No. 67-02540.
- Smith, E. R. Student achievement in Forkner and Gregg shorthand. Business Education Forum 25:44-46, February, 1971.
- Smith, E. R. and Reese, D. Shorthand: vocabulary and speed tests. Knoxville, TN: Words, Inc., 1974.
- Stoddard, T. D. A shorthand validation study. Century 21 Reporter, Fall 1976, pp. 5-6, 8-9.
- Talbot, A. A. An evaluation of vocational shorthand competency attained in Utah high schools. Masters thesis, Utah State University at Logan, 1969.
- Thorndike, R. L. Two screening tests of verbal intelligence. Journal of Applied Psychology 26:128-135, 1942.
- Tonne, H. A., Popham, E. L., and Freeman, M. H. Methods of teaching business subjects (3rd ed.). New York: Gregg Division, McGraw-Hill Book Company, 1965.

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Appendix A

EDUCATIONAL TESTING SERVICE

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September 10, 1975

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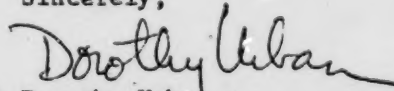
Dear Professor Lambrecht:

In response to your letter of August 27, 1975, Educational Testing Service is pleased to grant you permission to reproduce and use in your research project, an adapted version of the out-of-print test form PM (Cooperative English).

It is understood that this permission is limited to the study described in your letter, and that you will use the credit line shown on the materials enclosed with that letter.

If these arrangements are satisfactory, please sign both copies of this letter and return one copy to me for our records.

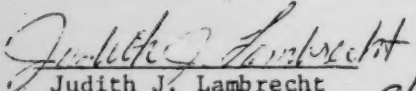
Sincerely,


(Mrs.) Dorothy Urban
Copyrights, Licensing and
Permissions Administrator

DU/lb

cc: Ms. Bogatz
Ms. Tchori

ACCEPTED AND AGREED TO:


Judith J. Lambrecht 9/15/75

Permission to Use Cooperative English Test

August 27, 1975

Mrs. Dorothy Urban
Copyrights, Licensing and
Permissions Administrator
Educational Testing Service
Princeton, New Jersey 08540

Dear Mrs. Urban:

In November, 1972, Mona J. Casady was granted permission by Educational Testing Service to reproduce and use the out-of-print Cooperative English Test Form PM in her doctoral research at the University of Minnesota. Since Dr. Casady collected reliability data for this test in her study, I would like to make use of this same instrument again for another research project being conducted at the University of Minnesota.

I am the director of a research project in the Division of Business Education which will obtain shorthand achievement data from approximately 20 high schools in the Minneapolis-St. Paul area. I would like to use this adaptation of the Cooperative English Test as a covariate in this study.

A copy of the form of the test Dr. Casady used, and which includes the appropriate credit line on the back page, is enclosed. May I have your permission to reproduce and use this test?

Sincerely yours,

Judith J. Lambrecht
Assistant Professor
Business Education

JJL:ib

Appendix B

Shorthand Dictation Tests
Middle of Year and End of Year

MID-YEAR DICTATION ACHIEVEMENT TESTS, 1st year

50 WPM, LETTER NO. 1

Dear Miss Jones: Thank you for your letter of May 10 telling
 us how much you enjoyed your flight with us from New York Cit- / (1)
 y to San Francisco. Your comments are very much ap- (2)
 preciated. During the past ten years, we have added /
 many new flights to enable people to go from one (3)
 part of the country to another quickly and on time. /
 Because of our constant concern for improved service, we (4)
 have made travel by jet available on most of our /
 flights. As you may know, we have also eliminated
 the weight requirement for your bags. Yours very truly,

64.89% common words (200)

98 actual words

100 standard words

s.i. = 1.43

MID-YEAR DICTATION ACHIEVEMENT TESTS, 1st year

50 WPM, LETTER NO. 2

Dear Mr. Harper: Your check in the amount of \$9,

(1)
which covers payment of your telephone No. /

7798, has been returned to us by the

(2)
bank because of insufficient funds. Since I have been un- /

able to contact you by telephone, I want to ad-

(3)
vise you that we have recharged this to your past-due account. /

The total amount currently due is \$9. May

(4)
we have payment soon for this amount? After receiving /

payment, we shall send you the check for \$9 which was

returned to us on January 31. Yours truly,

69.66% common words

91 actual words

100 standard words

s.i. = 1.54

MID-YEAR DICTATION ACHIEVEMENT TESTS

50 WPM, LETTER NO. 3

Dear Mrs. Case: The problems to be used to help students
 learn to address an envelope were indeed welcome. It /⁽¹⁾
 was kind of you to share the work of your staff with us. We
 appreciated your suggestion that we make dupli /⁽²⁾
 cate copies. Because we have done so, our teaching should be
 so much more effective than it has been previously. /⁽³⁾
 Our relations have always been so pleasant. No small part
 is due to the materials you permit us to use /⁽⁴⁾
 without any charge. We sincerely appreciate your
 prompt, timely, and professional help. Very cordially,

61.70% common words

94 actual words

100 standard words

s.i. = 1.49

Balsley (1973), p. 6

MID-YEAR DICTATION ACHIEVEMENT TESTS

60 WPM, LETTER NO. 1

Dear Neighbor: If you need money for any reason, you
 can borrow it here at low bank rates and take three years to / (1)
 repay. For example, \$1,000 is just \$34
 a month. You can also receive the life insurance pro- / (2)
 tection at no additional cost. Also, you can get
 almost any amount you need for reasons such as to / (3)
 pay off bills, to purchase new furniture, to take that va-
 cation you have always wanted, or to reduce your cash / (4)
 outlay each month by combining your present debts. Many
 customers cut monthly payments by half or more. Sincerely, / (5)

61.70% common words

96 actual words

100 standard words

s.i. = 1.46

Smith and Reese (1974), p. 27

MID-YEAR DICTATION ACHIEVEMENT TESTS

60 WPM, LETTER NO. 2

Dear Friend: The enclosed coupon is worth \$2 to you. (1)
 Just detach and mail it today. You will promptly receive /
 a full year's trial subscription to Home. At regular or- (2)
 der rates, a year of Home is a \$4 value; but /
 your coupon will give you this at half-price. You pay only (3)
 \$2; and we will bill you later after we send /
 you your first copy of Home. Your satisfaction is guar- (4)
 anteed. Even at this special half-price offer, if you /
 are not 100 percent delighted with Home, just tell (5)
 us and you will receive a refund for all copies not /
 yet in the mail. Cordially yours,

60.0% common words

107 actual words

106 standard words

s.i. = 1.39

MID-YEAR DICTATION ACHIEVEMENT TESTS

60 WPM, LETTER NO. 3

Dear Mr. Williamson: We are pleased you and Mrs. William-
 son can visit with us on December 20. There is ⁽¹⁾ /
 never enough time for a visitor to see as much
 or talk to as many persons as would be desir- ⁽²⁾ /
 able. However, we shall try to give you as complete a
 look at our community as we can during your vis- ⁽³⁾ /
 it here. I have reservations for you at the John-
 son Motor Lodge, which is just off Highway 40. Upon ⁽⁴⁾ /
 your arrival, telephone my office. We shall look for-
 ward to a very pleasant visit with you and your wife. ⁽⁵⁾ /
 Cordially yours,

68.69% common words

98 actual words

103 standard words

s.i. = 1.47

Smith and Reese (1974), p. 33

MID-YEAR DICTATION ACHIEVEMENT TESTS

70 WPM, LETTER NO. 1

Dear Reader: We hate to lose an old friend such as you at
 a time when we are sure you would enjoy the many re- /
 laxing hours of reading pleasure. Because we do not want
 you to miss this pleasant experience, we are willing /
 to make you a special offer. Just punch out the circle
 on the enclosed certificate, and we will send you a /
 full year of High Lights, or 52 issues, for only
 \$5. This amount is a savings of 50 per- /
 cent from the regular annual subscription value
 of \$10, and it is the lowest rate per copy /
 for which anyone can buy High Lights. Yours truly,

62.96% common words

108 actual words

110 standard words

s.i. = 1.43

Smith and Reese (1974), p. 22

MID-YEAR DICTATION ACHIEVEMENT TESTS

70 WPM, LETTER NO. 2

Dear Mr. Good: As soon as some people stop tearing up
 their cars, we can tear up our rate increases. Last year, more / (1)
 than 50,000 people died on our highways and well
 over a million were injured. Your newspaper told about / (2)
 it every day and also reported the rising
 cost of these traffic accidents. Damage costs have gone up / (3)
 to the highest level ever. Accidents do not have
 to happen. If each person drove with an alert atti- / (4)
 tude, thousands of lives could be saved each year on our roads. Now
 you have to drive carefully for yourself and the other
 driver as well. Sincerely yours,

60.95% common words

105 actual words

106 standard words

s.i. = 1.41

Smith and Reese (1974), p. 30

MID-YEAR DICTATION ACHIEVEMENT TESTS

70 WPM, LETTER NO. 3

Dear Senior: Graduation will be one of the high points
 of your life. It is a gateway to a new way of liv- / (1)
 ing, and it signifies a recognition for your long
 and hard work. You may be very proud of your achievements. / (2)
 On behalf of the 23,000 Phillips dealers,
 I would like to extend best wishes to you on your forth- / (3)
 coming graduation from college. As you enter in-
 to your new work, we want to be counted among your ear- / (4)
 ly business friends. We would like to serve you in a first-class
 manner as I know you will want to serve your associ- / (5)
 ates. Yours truly

67.02% common words

104 actual words

103 standard words

s.i. = 1.39

Smith and Reese (1974), p. 38

END-OF-YEAR DICTATION ACHIEVEMENT TESTS, 1st year

60 WPM, LETTER NO. 1

Dear Mr. Bennett: Thank you for your letter about my
 bill. I had not realized that it had not been paid on its / (1)
 due date. Recently I had a change of personnel in
 my Accounting Department, and in the process your state- / (2)
 ment was not handled properly. I am enclosing a
 check with this letter. I am sorry about the delay. / (3)
 I hope our credit will remain good. As you said, a good
 credit rating is extremely important in contin- / (4)
 uing in business. Let me express my apprecia-
 tion for the way you handled my account. Cordially, / (5)

70.21% common words

94 actual words

100 standard words

s.i. = 1.49

END-OF-YEAR DICTATION ACHIEVEMENT TESTS, 1st year

60 WPM, LETTER NO. 2

Dear Mr. Smith: Favorable consideration was
 given to your request for more funds for better printing /⁽¹⁾
 service in your office. The church board has long been aware
 of the difficult conditions under which you and your /⁽²⁾
 staff have been working, but I think the board members do not
 realize how much technical matter you are being /⁽³⁾
 asked to duplicate. They also do not know the quanti-
 ty of copies being requested. Our financial sit- /⁽⁴⁾
 uation has improved enough for us to make a sub-
 stantial increase for your operations. Cordially, /⁽⁵⁾

62.07% common words

87 actual words

100 standard words

s.i. = 1.61

Balsley (1973), p. 2

END-OF-YEAR DICTATION ACHIEVEMENT TESTS, 1st year

60 WPM, LETTER NO. 3

Dear Sue: I appreciate so very much your letter
 in which you asked me to apply for a secretari- /⁽¹⁾
 al position in the offices of the Agricul-
 tural Administration. I don't know whether I am /⁽²⁾
 worth your confidence, but I thank you for it. Today I
 am sending in my records to the address you enclosed /⁽³⁾
 in your letter. Several years ago I did hold a
 temporary position with a similar agen- /⁽⁴⁾
 cy, and I enjoyed the work very much. I shall let you
 know whether I am accepted for the job. Sincerely, /⁽⁵⁾

65.56% common words

90 actual words

100 standard words

s.i. = 1.56

Balsley (1973), p. 3

END-OF-YEAR DICTATION ACHIEVEMENT TESTS

70 WPM, LETTER NO. 1

Gentlemen: I would like to make a reservation at
 your American Hotel for Monday, Tuesday, and Wednesday, (1)
 March 8, 9, and 10. I would like to have a double
 room for my wife and me. We shall arrive during the morn- (2)
 ing of March 8 and would appreciate it if we could
 check into our room when we arrive. While we are in Dal- (3)
 las on this trip, my wife and I want to visit several
 places of interest. Could you perhaps suggest some of the (4)
 more important places of interest and also some good
 places to eat. We are also interested in seeing (5)
 a play. Cordially yours,

59.43% common words

106 actual words

104 standard words

s.i. = 1.37

Smith and Reese (1974), p. 17

END-OF-YEAR DICTATION ACHIEVEMENT TESTS

70 WPM, LETTER NO. 2

Dear Mr. Waterman: Because you have an interest in
 our rugs, we are offering you a free Craft Rug Kit. It / (1)
 is free when you order one of our regular rug kits.
 The complete kit consists of a special needle which you / (2)
 can use when making any of our rugs, material
 necessary for making a 2 by 3 foot rug, a / (3)
 supply of quality yarn in the color of your choice,
 and complete, easy-to-follow instructions. With these kits, / (4)
 you can make beautiful rugs which will call attention to
 your floor. If you have never tried this before, you will be / (5)
 amazed how easy and enjoyable it is to make
 these rugs. Sincerely yours,

59.13% common words

115 actual words

114 standard words

s.i. = 1.46

Smith and Reese (1974), p. 26

END-OF-YEAR DICTATION ACHIEVEMENT TESTS

70 WPM, LETTER NO. 3

Dear Mr. Patrick: We have your letter dated September 26 concerning your tire problem. We can appreciate the trouble you have had because this is a tire problem rather than a defect in your automobile. The fact that you have had the problem twice within a short length of time would certainly give you reason to be disappointed with the performance of the tires. If you were in St. Louis, we would handle the situation directly with the tire company. Because you are not, we would suggest that you write directly to the Firestone Tire and Rubber Company, Akron, Ohio, with a complaint. Cordially,

64.42% common words

104 actual words

111 standard words

s.i. = 1.51

Smith and Reese (1974), p. 34

END-OF-YEAR DICTATION ACHIEVEMENT TESTS

80 WPM, LETTER NO. 1

Dear Friend: Because you are one of our valued customers, (1)
 we want you to receive special service. Therefore, we want /
 you to have an opportunity for a preview and (2)
 first choice during our annual spring sale of furniture /
 and home furnishings. All you have to do is give the en- (3)
 closed card with your name stamped on it to a salesman in our /
 store during the days of Monday, Tuesday, Wednesday, or Thurs- (4)
 day, August 8, 9, 10, or 11. The items you /
 will see on special sale will not be offered to the pub- (5)
 lic until August 12. In this week you may buy any /
 item listed in the enclosed brochure. Sincerely yours,

64.86% common words

111 actual words

110 standard words

s.i. = 1.41

Smith and Reese (1974), p. 19

END-OF-YEAR DICTATION ACHIEVEMENT TESTS

80 WPM, LETTER NO. 2

Dear Mr. Lane: Enclosed is a chart which shows some typi-
 cal city-by-city savings from our preferred rate au- /
 to insurance program. Is your home town, or a town like (1)
 it, on our chart? By looking at the chart, you will get a / (2)
 good idea how much money you can save each year by (3)
 buying auto insurance through our plan. For an even /
 better idea of the savings, send in the rate quo- (4)
 tation card. There is no obligation, and no salesman /
 will call on you. This plan is offered by Executive (5)
 Insurance Company, a company that specializes /
 in insuring professional persons such as you. Cordially,

63.81% common words

105 actual words

110 standard words

s.i. = 1.48

END-OF-YEAR DICTATION ACHIEVEMENT TESTS

80 WPM, LETTER NO. 3

Dear Reader: Because we have good reason to believe that
 you belong among its many readers, we would like to /⁽¹⁾
 send you the next 20 issues to Town for one-half the
 regular price. Just return the enclosed card, and you will /⁽²⁾
 receive Town at the special rate of 20 weeks for on-
 ly \$2. What is more, you need send no money now. /⁽³⁾
 For your convenience, we will bill you later after your
 issues start to come. You will not want to miss one issue. /⁽⁴⁾
 We know that as a person with above-average background
 and interests, you will really like the variety of /⁽⁵⁾
 reading pleasure that Town brings you each week. Sincerely,

64.29% common words

113 actual words

110 standard words

s.i. = 1.38

October 22, 1975

Judith J. Lambrecht
270 Peik Hall
Division of Business Education
Minneapolis Campus

RE: "Evaluation of First-Year Shorthand Achievement"

Dear Ms. Lambrecht:

Thank you for your letter of October 13, 1975. The information in the letter and the attached consent document appear to cover all of the aspects of confidentiality, project description, etc., that the Committee requires, and I feel that the change in procedure can be approved without additional review at this time.

Thank you for bringing this revision in your protocol to the Committee's attention. We wish you continuing success with your research.

Sincerely,

Caroline V. Pierson
Executive Secretary
Committee on the Use of Human
Subjects in Research

CVP:mrw

Human Subjects Procedures

October 13, 1975

Ms. Caroline V. Pierson
Executive Secretary
Committee on the Use of Human
Subjects in Research
Office of Research Administration
2642 University Avenue
St. Paul, Minnesota 55114

Dear Ms. Pierson:

Enclosed is a copy of the revised letter which is being sent to all parents of students participating in the "Evaluation of First-Year Shorthand Achievement". On September 18 we talked on the phone about the changes which were made in this parent-notification procedure.

Because the starting date for high schools was in many instances the same as the date on which this project was funded, it was not possible to notify parents of this activity before the administration of the pretest. The similarity of the tests which are being used in this research to those which are typically available and used by shorthand teachers, however, seems to warrant the modified procedures which we discussed. Parents and students now have the option of refusing to have their scores released to me as a person outside of the high school.

High school principals have been quite agreeable to these procedures. In some instances they have asked to address the envelopes themselves rather than supply me with the addresses. It is encouraging to have good cooperation in fulfilling this requirement.

Sincerely yours,

Judith J. Lambrecht
Assistant Professor
Business Education

JJL:ib

Enclosure

August 26, 1975

Judith J. Lambrecht
270 Peik Hall
Division of Business Education
Minneapolis Campus

RE: "Evaluation of First-Year Shorthand Achievement"

Dear Ms. Lambrecht:

I am pleased to advise you that the Committee on the Use of Human Subjects in Research has approved your project referenced above. The Committee does require, however, that you give the student the opportunity to consent to participate, as well as the parent(s). In addition, we would like to have an indication of approval from the schools where you will conduct your study. Please notify the Committee office at 373-9895 should there be any change in the research procedures as approved.

The Committee wishes you every success with this study.

Sincerely,

Caroline V. Pierson
Executive Secretary
Committee on the Use of Human
Subjects in Research

CVP:mrw

cc: Dr. Jerry Moss



UNIVERSITY OF MINNESOTA
TWIN CITIES

Division of Business Education
Department of Vocational and Technical Education
College of Education
Peik Hall
Minneapolis, Minnesota 55455

October 31, 1975

Office phone: 373-0112

Dear Parent:

During the 1975-76 school year the shorthand teachers and administrative staff in _____ High School are cooperating in a city-wide shorthand study. The purpose of this study is to make achievement comparisons among three different shorthand systems taught in the Twin Cities area. Scores are being collected from students in beginning shorthand classes at the beginning, middle, and end of the school year.

The purpose of this letter is to inform you of this testing activity and to permit you the option of requesting that your student's scores not be included, if you desire. This requirement of parent notification applies to all evaluation activities in which data will be made available to persons outside of the high school.

In the comparisons of shorthand achievement which are planned, there will be no identification of individual students, their teachers, nor the high schools attended. The sole purpose is to permit business teachers to compare the achievement that is possible when different shorthand systems are taught. The tests which will be given do not differ from the tests which shorthand teachers normally use. The difference is that the same tests are being used in all of the high schools participating in this evaluation.

Please notice that these tests are being administered with the approval and cooperation of the high school teachers and administrative staff. Maximum value from the information can be gained when all students in beginning shorthand participate by permitting their scores to be included. If you or your daughter or son prefer NOT to have her or his scores included, the attached form should be returned to her or his shorthand teacher. If you have any questions about this evaluation activity, please feel free to call me at the number given in the letterhead.

Sincerely yours,

Judith J. Lambrecht
Assistant Professor of
Business Education and
Project Director

Enclosure

SHORTHAND ACHIEVEMENT EVALUATION
1975-76

Parent Copy

It is my understanding that pretests and achievement tests are being administered in selected beginning shorthand classes in Twin Cities high schools. I request that my daughter's/son's scores NOT be made available to the Shorthand Achievement Project Director and NOT included in the city-wide comparisons.

SIGNED

Parent

Student

High School

SHORTHAND ACHIEVEMENT EVALUATION
1975-76

Student Copy-

It is my understanding that pretests and achievement tests are being administered in selected beginning shorthand classes in Twin Cities high schools. I request that my scores NOT be made available to the Shorthand Achievement Project Director and NOT included in the city-wide comparisons.

SIGNED

Student

High School

Test Administration Directions

PRETEST ADMINISTRATIONInstructionsSHORTHAND ATTITUDE SCALE

Approximate Time: 2 Minutes

No student names on this. Read the directions with the students and then collect as students finish. Students should not be timed.

Please administer within the first two weeks of class.

20-WORD VOCABULARY TEST

Approximate Time: 5 Minutes

Students should complete all identifying information. Emphasize that students should answer every question, even if they are guessing at the answer. Read through the instructions printed on the form. Students should not be timed; each should complete the entire test.

Please administer within the first two weeks of class.

BYERS' FIRST-YEAR SHORTHAND APTITUDE TESTS

Approximate Time: 30 Minutes

This test needs to be timed carefully.

Part I, Phonetic Perception: 10 minutes

Part II, Observation Aptitude: 5 minutes

Part III, Disarranged Syllables: 10 minutes

Make sure the students provide all of the identifying information on the Separate Answer Sheet. No marks should be made in the test booklet.

Read the directions with the students. Notice that examples are provided for each section. The answers to these are marked on your copy. Time each section of the test separately.

Please administer within the first two weeks of classes.

TRANSCRIPTION PRETEST

Approximate Time: 25 Minutes

This test does not need to be timed. Everyone should complete all the parts. Make sure students provide all the identifying information on the front cover.

Please administer within the first four weeks of class.

EVALUATION OF FIRST-YEAR SHORTHAND ACHIEVEMENT

1975-76

D I R E C T I O N SM I D - Y E A R
SHORTHAND DICTATION ACHIEVEMENTS TESTSTESTS TO BE ADMINISTERED1) Dictation Tests on 3 different days

Each test contains three letters to be transcribed.

Speeds: 50, 60, and 70 words per minute

Length: Each letter is approximately 100 words.

Type of Material: New-matter, non-previewed, easy vocabulary. Each letter of 100 words includes 60 to 70 percent of its words from the 200 most-frequently used business words (Perry Vocabulary List).

2) Shorthand Attitude Inventory

This is the same test that was given as a pretest. It will also be administered at the end of the year so changes in students' attitudes toward learning shorthand can be determined.

WHEN TO ADMINISTER TESTS1) Dictation Tests on 3 different days

The three days on which you choose to administer these tests should be during the 16th, 17th, or 18th week of school. Choose these days so that it is convenient for you and so all of your students can take all three tests.

Absences are hard to avoid, but please encourage your students to be present for these or to make them up if that is necessary.

2) Shorthand Attitude Inventory

Administer this at about the same time as the dictation tests--during the 16th, 17th, or 18th week of school.

Please DO NOT administer this on the same day as one of the three dictation tests. The Shorthand Attitude Inventory takes only about 5 minutes to administer, but that time could be important to students in transcribing the dictation tests. Please find 5 minutes on another day during these three weeks.

MATERIALS NECESSARY

- 1) Package of Shorthand Attitude Inventory sheets--one for each student
- 2) One tape containing the three days of dictation.

Each teacher will have his or her own 60-minute tape. Side 1 contains the letters for Day 1 and Day 2; Side 2 contains the letters for Day 3. This is the format of the dictation on the tape:

SIDE 1

DAY 1: Identification of the tests and directions
 Warm-Up Letter at 60 wpm
 Letter at 50 wpm
 Letter at 60 wpm
 Letter at 70 wpm

Pause for about 2 minutes

DAY 2: Identification of the tests and directions
 Warm-Up Letter at 60 wpm
 Letter at 50 wpm
 Letter at 60 wpm
 Letter at 70 wpm

SIDE 2

DAY 3: Identification of tests and directions
 Warm-Up Letter at 60 wpm
 Letter at 50 wpm
 Letter at 60 wpm
 Letter at 70 wpm

- 3) Shorthand notebooks and pens for students

Students may use whatever notebooks they have been using in class. If the back side of the pages in a student's notebook have shorthand written on them, lines should be drawn through this to indicate that it is not the test dictation.

- 4) Paper for transcribing the letters, one page per letter (there are 9 letters)

To make these tests as nonthreatening as possible for the students, I would like them to be able to use the kind of paper they have been using all year. This might mean transcribing in longhand on shorthand notebook paper, transcribing in longhand on other ruled paper, or typewriting on typing paper.

If you would like me to supply you with the paper rather than have students use what is already available to them, please let me know.

PROCEDURES FOR TEST ADMINISTRATION1) Shorthand Attitude Inventory

Time: Approximately 5 minutes

No students names are required on this test. Please ask students to write their school name, class period, and date at the top of the page.

2) Shorthand Dictation Tests

Time: entire class period on three days

Using the Taped Dictation:

DAY 1 - Begin the tape on SIDE 1. The introduction and directions, the warm-up letter, and the three test letters take approximately 8 minutes.

STOP the tape at the end of the dictation of the 70 wpm letter. DO NOT rewind the cassette tape; you can begin in this spot on Day 2.

Rewind the reel-to-reel tape; you may use the leader spliced into the middle of the tape to tell you where to begin on Day 2.

DAY 2 - Begin the tape in the middle of SIDE 1 right where you left off on Day 1. There is a pause of about 2 minutes before the beginning of the dictation for Day 2.

After the dictation of the 70 wpm letter (again about 8 minutes), play the tape forward to the end of the tape. You will then be ready to begin SIDE 2 for Day 3.

DAY 3 - Begin SIDE 2 of the tape. The pattern of dictation is the same as for Day 1 and Day 2, again about 8 minutes.

At the completion of the dictation of the 70 wpm letter, you may rewind the tape.

Shorthand Note Identification: On each of the three days, ask students to put their names, the school name, class period, and date at the top of a new shorthand notebook page. The dictation tape will remind them to do this.

Transcription Letter Identification: Ask students to put their name, the school name, class period, date, and dictation speed at the top of each letter they transcribe.

Letter Transcription

Ask the students to transcribe all of the letters on each of the three days, or the letters at 50, 60, and 70 wpm. The warm-up letter is NOT to be transcribed.

The letters may be transcribed either in longhand or at the typewriter, whichever practice you have been following for other transcription activities in your class.

Students may (and should) use dictionaries as they transcribe the letters. They are to correct any errors they make. An eraser or another correction method of your approval should be used. Since there are no inside addresses, the students need not be concerned about letter placement.

Students should begin transcribing with the 50 wpm letter and proceed to the 60 and then the 70 wpm letter.

Timing of Transcription

It is hoped that students can transcribe all three letters each day by the end of the class period. Except for the length of the class period, there is no restriction on transcription time. IT IS IMPORTANT, HOWEVER, THAT THE TIME IT TAKES EACH STUDENT TO TRANSCRIBE EACH LETTER BE NOTED.

BEGIN your STOPWATCH when you ask the students to begin to transcribe the letters each of the three days. As each student completes a letter, ask him or her to raise a hand. You should then go to that student and write on the completed letter the minutes and seconds that have elapsed since the beginning of the transcription period. Do this for the separate letters dictated at 50, 60, and 70 wpm.

The time for the 60 wpm (and 70 wpm) letter will, of course, be longer in elapsed time than for the 50 wpm letter. When the tests are scored, the necessary subtraction will be done to determine the time it took each student to complete each letter. You do not have to do this subtraction. It is important, however, that you note on each student's paper the elapsed time.

If several students are raising their hands at once and you do not feel you can go to each one, you may write the elapsed time on the board and the students can write it on their papers.

Collection of Papers

On each of the three days, collect the following from each student:

- (1) 3 transcribed letters at 50, 60, and 70 wpm
- (2) shorthand notes for these three letters (this will also include the warm-up letter that was not transcribed.)

Place the shorthand notes at the back of the three letters and staple the set together.

You will then be returning the transcribed letters and shorthand notes for each student for three days. This is a total of nine letters for each student.

RETURN TO THE UNIVERSITY OF MINNESOTA

Return the following to the University of Minnesota by MAIL (or ask me to pick up):

- (1) Shorthand Attitude Inventories
- (2) 3 sets of letters for each student, one for each test day.
This is a total of nine letters plus shorthand notes.
- (3) One dictation tape

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EVALUATION OF FIRST-YEAR SHORTHAND ACHIEVEMENT

1975-76

D I R E C T I O N SE N D - O F - Y E A R
SHORTHAND DICTATION ACHIEVEMENT TESTSTESTS TO BE ADMINISTERED1) Dictation Tests on 3 different days

Each test contains three letters to be transcribed.

Speeds: 60, 70, and 80 words per minute

Length: Each letter is approximately 100 words.

Type of Material: New-matter, non-previewed, easy vocabulary. Each letter of 100 words includes 60 to 70 percent of its words from the 200 most-frequently used business words (Perry Vocabulary List).

2) Shorthand Attitude Inventory

This is the same test that was given as a pretest. It will also be administered at the end of the year so changes in students' attitudes toward learning shorthand can be determined.

WHEN TO ADMINISTER TESTS1) Dictation Tests on 3 different days

The three days on which you choose to administer these tests should be during the last three weeks of the school year. I recommend avoiding the last week of school if you plan to use this time for your own student evaluation. Choose these days so that it is convenient for you and so all of your students can take all three tests.

Absences are hard to avoid, but please encourage your students to be present for these or to make them up if that is necessary.

2) Shorthand Attitude Inventory

Administer this at about the same time as the dictation tests--during the last three weeks of school.

Please DO NOT administer this on the same day as one of the three dictation tests. The Shorthand Attitude Inventory takes only about 5 minutes to administer, but that time could be important to students in transcribing the dictation tests. Please find 5 minutes on another day during these three weeks.

MATERIALS NECESSARY

- 1) Package of Shorthand Attitude Inventory sheets--one for each student
- 2) One tape containing the three days of dictation.

Each teacher will have his or her own 60-minute tape. Side 1 contains the letters for Day 1 and Day 2; Side 2 contains the letters for Day 3. This is the format of the dictation on the tape:

SIDE 1

Day 1: Identification of the tests and directions
 Warm-Up Letter at 80 wpm
 Letter at 60 wpm
 Letter at 70 wpm
 Letter at 80 wpm

Pause for about 2 minutes

Day 2: Identification of the tests and directions
 Warm-Up Letter at 80 wpm
 Letter at 60 wpm
 Letter at 70 wpm
 Letter at 80 wpm

SIDE 2

Day 3: Identification of tests and directions
 Warm-Up Letter at 80 wpm
 Letter at 60 wpm
 Letter at 70 wpm
 Letter at 80 wpm

- 3) Shorthand notebooks and pens for students

Students may use whatever notebooks they have been using in class. If the back side of the pages in a student's notebook have shorthand written on them, lines should be drawn through this to indicate that it is not the test dictation.

- 4) Paper for transcribing the letters, one page per letter (there are 9 letters)

To make these tests as nonthreatening as possible for the students, I would like them to be able to use the kind of paper they have been using all year. This might mean transcribing in longhand on shorthand notebook paper, transcribing in longhand on other ruled paper, or typewriting on typing paper.

If you would like me to supply you with the paper rather than have students use what is already available to them, please let me know.

PROCEDURES FOR TEST ADMINISTRATION1) Shorthand Attitude Inventory

Time: Approximately 5 minutes

No students names are required on this test. Please ask students to write their school name, class period, and date at the top of the page.

2) Shorthand Dictation Tests

Time: Entire class period on three days

Using the Taped Dictation:

DAY 1 - Begin the tape on SIDE 1. The introduction and directions, the warm-up letter, and the three test letters take approximately 8 minutes.

STOP the tape at the end of the dictation of the 80 wpm letter. DO NOT rewind the cassette tape; you can begin in this spot on Day 2.

Rewind the reel-to-reel tape; you may use the leader spliced into the middle of the tape to tell you where to begin on Day 2.

DAY 2 - Begin the tape in the middle of SIDE 1 right where you left off on Day 1. There is a pause of about 2 minutes before the beginning of the dictation for Day 2.

After the dictation of the 80 wpm letter (again about 8 minutes), play the tape forward to the end of the tape. You will then be ready to begin SIDE 2 for Day 3.

DAY 3 - Begin SIDE 2 of the tape. The pattern of dictation is the same as for Day 1 and Day 2, again about 8 minutes.

At the completion of the dictation of the 80 wpm letter, you may rewind the tape.

Shorthand Note Identification: On each of the three days, ask students to put their names, the school name, class period, and date at the top of a new shorthand notebook page. The dictation tape will remind them to do this.

Transcription Letter Identification: Ask students to put their name, the school name, class period, date, and dictation speed at the top of each letter they transcribe.

Letter Transcription

Ask the students to transcribe all of the letters on each of the three days, or the letters at 60, 70, and 80 wpm. The warm-up letter is NOT to be transcribed.

The letters may be transcribed either in longhand or at the typewriter, whichever practice you have been following for other transcription activities in your class.

Students may (and should) use dictionaries as they transcribe the letters. They are to correct any errors they make. An eraser or another correction method of your approval should be used. Errors should NOT be corrected by striking over. Since there are no inside addresses, the students need not be concerned about letter placement.

Students should begin transcribing with the 60 wpm letter and proceed to the 70 and then the 80 wpm letter.

Timing of Transcription

It is hoped that students can transcribe all three letters each day by the end of the class period. Except for the length of the class period, there is no restriction on transcription time. IT IS IMPORTANT, HOWEVER, THAT THE TIME IT TAKES EACH STUDENT TO TRANSCRIBE EACH LETTER BE NOTED.

BEGIN your STOPWATCH when you ask the students to begin to transcribe the letters each of the three days. As each student completes a letter, ask him or her to raise a hand. You should then go to that student and write on the completed letter the minutes and seconds that have elapsed since the beginning of the transcription period. Do this for the separate letters dictated at 60, 70, and 80 wpm.

The time for the 70 wpm (and 80 wpm) letter will, of course, be longer in elapsed time than for the 60 wpm letter. When the tests are scored, the necessary subtraction will be done to determine the time it took each student to complete each letter. You do not have to, and should not do this subtraction. It is important, however, that you note on each student's paper the elapsed time.

If several students are raising their hands at once and you do not feel you can go to each one, you may write the elapsed time on the board and the students can write it on their papers.

Collection of Papers

On each of the three days, collect the following from each student:

- (1) 3 transcribed letters at 60, 70, and 80 wpm
- (2) Shorthand notes for these three letters (this will also include the warm-up letter that was not transcribed.)

Place the shorthand notes at the back of the three letters and staple the set together.

You will then be returning the transcribed letters and shorthand notes for each student for three days. This is a total of nine letters for each student.

RETURN TO THE UNIVERSITY OF MINNESOTA

Return the following to the University of Minnesota by MAIL (or ask me to pick up):

- (1) Shorthand Attitude Inventories
- (2) 3 sets of letters for each student, one for each test day.
This is a total of nine letters plus shorthand notes.
- (3) One dictation tape

Judith J. Lambrecht
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SHORTHAND TEST ADMINISTRATION DIRECTIONS
Reliability Testing

127

WHEN TO ADMINISTER

Choose two class periods, one week apart. The same three letters will be dictated from tape at _____ wpm and transcribed on both days.

SUPPLIES NEEDED

One cassette tape -- Provided
Bond Paper -- Provided

Shorthand Notebooks -- Students'
and Pens
Stopwatch -- Your Own

ADMINISTRATION

Please do not tell the students they will be taking the same letters in both test sessions, as this might cause them to give more attention than usual to the content of the letters the first time.

Student Identification of Papers

At the top of the bond paper, students should type the following four pieces of information:

Name
Date

School
Class period

This information may be typed on the paper either before the dictation or before beginning to transcribe. Do not, however, include this in the timing of the transcription itself.

Dictation

One cassette contains the dictation to be used on both days. The same letters are to be dictated on both days. The tape contains a warmup letter at _____ wpm and three short letters at _____ wpm. Each of these three letters is approximately 100 words long. Play the cassette completely through the dictation. Students should write all of the letters from dictation. The last three letters are to be transcribed, but not the warmup letter.

Transcription

Students should transcribe at the typewriter all three letters at _____ wpm. This transcription may all be done on a single sheet of paper. The letters are short enough to get all three on a page with several spaces in between each letter.

All errors should be corrected while transcribing. This correction should be done with a typewriter eraser or any other correcting device (liquid paper or type-over paper) acceptable to you. Errors should not be corrected by striking over or X-ing out.

(OVER)

Timing the Transcription

Begin your stopwatch as soon as students begin to type. As students complete the first letter, ask them to raise their hands. When you see a hand, tell the student the number of minutes and seconds which have elapsed on the stopwatch. Either write this time on the chalkboard or tell the student orally. The student should write this time next to the letter just completed.

When the second and third letters are completed, again have the student raise her hand and then write the elapsed time from the stopwatch in minutes and seconds next to the letter just completed. When I get the letters, I will subtract the times to get the number of minutes and seconds required for each letter. You do not need to do this subtraction.

It is important, however, that the times for the letters be noted as accurately as possible and that all students complete all three letters.

SCORING

You do NOT need to score the letters. When I receive the letters from you, I will be scoring them three ways:

- | | |
|-----------------------------------|---|
| 1) Shorthand Percent of Accuracy: | All the words which have been transcribed correctly will be counted. Spelling and other English style elements will not be considered in this score. The percent of accuracy for the three letters will be averaged to yield one score. |
| 2) English Style Errors: | Spelling and typing errors, punctuation errors, word division errors, etc. will be counted. Paragraphing will not be scored as paragraphs were not dictated. The number of English errors on the three letters will be averaged to yield one score. |
| 3) Transcription Time: | The amount of time required to transcribe each letter will be calculated. The times for all three letters will be averaged to yield one score. |

MATERIALS TO RETURN TO THE UNIVERSITY

After the second administration of the dictation tests, please MAIL the typewritten transcripts to me. There should be two sheets for each student, one for each day. It is important that students be present both days so that their scores may be compared. The shorthand notes do not need to be collected. Please include the cassette tape when the tests are mailed. You will be reimbursed for the postage.

Please mail to:

Dr. Judith J. Lambrecht
Division of Business Education
270 Peik Hall
University of Minnesota
Minneapolis, MN 55455

Appendix E

Table A-1

Parallel-Form Reliability of Single Dictation Test Scores
Percent of Accuracy, Number of English Errors and Transcription Time, 50, 60 and 70 wpm
(N = 75)

Type of Score and Speed	Administration						r		
	1st		2nd		3rd		1 & 2	2 & 3	1 & 3
	mean	s.d.	mean	s.d.	mean	s.d.			
<u>Percent of Accuracy</u>									
50 wpm	78.31%	15.05	76.37%	17.16	86.67%	12.14	.70	.72	.77
60 wpm	65.19%	17.83	66.40%	18.72	77.16%	16.22	.74	.65	.62
70 wpm	53.09%	16.56	59.65%	15.97	51.16%	15.04	.78	.65	.63
<u>Number of English Errors</u>									
50 wpm	4.77	2.78	3.37	2.31	7.57	2.62	.36	.42	.51
60 wpm	8.32	3.34	4.99	2.73	4.04	2.73	.27	.29	.32
70 wpm	3.39	1.92	5.57	2.74	3.56	2.12	.35	.42	.32
<u>Transcription Time in Minutes</u>									
50 wpm	6.73	1.89	6.18	1.45	6.12	1.53	.27	.37	.39
60 wpm	7.06	1.57	5.93	1.41	5.43	1.34	.43	.45	.18
70 wpm	5.54	1.57	5.54	1.51	4.95	1.34	.27	.40	.36

Appendix F

Table A-2

Middle of Year Means and Standard Deviations on
Shorthand Dictation Tests, Entire Groups

Measure	System			Total
	Gregg	Forkner	Century 21	
<u>Percent Accuracy</u>				
<u>50 wpm</u>	N = 529	N = 507	N = 55	N = 1091
Mean	63.63%	79.81%	73.78%	71.66%
s.d.	18.40	16.16	18.48	19.09
<u>60 wpm</u>	N = 506	N = 503	N = 56	N = 1065
Mean	53.47%	69.57%	62.45%	61.55%
s.d.	18.19	18.69	20.34	20.12
<u>70 wpm</u>	N = 501	N = 479	N = 56	N = 1036
Mean	41.73%	54.73%	49.14%	48.14%
s.d.	15.29	17.50	15.93	17.55
<u>Percent English Error</u>				
<u>50 wpm</u>	N = 529	N = 507	N = 55	N = 1091
Mean	8.73%	8.30%	11.16%	8.65%
s.d.	4.03	4.26	5.17	4.24
<u>60 wpm</u>	N = 506	N = 503	N = 56	N = 1065
Mean	10.28%	10.41%	12.90%	10.48%
s.d.	5.49	4.92	5.35	5.25
<u>70 wpm</u>	N = 501	N = 478	N = 56	N = 1035
Mean	7.70%	7.73%	12.43%	7.97%
s.d.	4.34	3.83	6.10	4.36
<u>Transcription Rate</u>				
<u>50 wpm</u>	N = 517	N = 488	N = 55	N = 1060
Mean (wpm)	10.34	12.43	9.39	11.25
s.d.	4.03	9.50	4.06	7.18
<u>60 wpm</u>	N = 495	N = 479	N = 55	N = 1029
Mean (wpm)	10.02	11.41	8.67	10.60
s.d.	3.57	4.16	3.81	3.95
<u>70 wpm</u>	N = 490	N = 466	N = 55	N = 1011
Mean (wpm)	10.17	11.10	8.81	10.53
s.d.	3.78	4.17	3.38	3.99

Table A-3

End of Year Means and Standard Deviations on
Shorthand Dictation Tests, Entire Groups

Measure	System			Total
	Gregg	Forkner	Century 21	
<u>Percent Accuracy</u>				
<u>60 wpm</u>	N = 468	N = 388	N = 51	N = 907
Mean	89.56%	91.85%	86.07%	90.35%
s.d.	11.51	9.59	19.65	11.45
<u>70 wpm</u>	N = 467	N = 385	N = 50	N = 902
Mean	78.90%	83.04%	77.29%	80.58%
s.d.	16.43	14.19	21.06	15.94
<u>80 wpm</u>	N = 453	N = 375	N = 48	N = 876
Mean	67.54%	68.20%	64.78%	67.68%
s.d.	18.40	18.30	20.98	18.50
<u>Percent English Error</u>				
<u>60 wpm</u>	N = 468	N = 388	N = 51	N = 907
Mean	4.60%	5.16%	3.77%	4.79%
s.d.	2.86	3.05	2.13	2.93
<u>70 wpm</u>	N = 467	N = 385	N = 50	N = 902
Mean	5.89%	6.56%	5.88%	6.18%
s.d.	3.24	3.60	3.46	3.42
<u>80 wpm</u>	N = 453	N = 375	N = 48	N = 876
Mean	7.87%	8.41%	7.52%	8.08%
s.d.	3.96	4.05	3.89	4.00
<u>Transcription Rate</u>				
<u>60 wpm</u>	N = 453	N = 377	N = 50	N = 880
Mean (wpm)	14.62	15.43	10.82	14.75
s.d.	4.50	5.09	4.81	4.89
<u>70 wpm</u>	N = 451	N = 373	N = 50	N = 874
Mean (wpm)	13.37	14.73	10.88	13.81
s.d.	3.68	4.30	4.41	4.11
<u>80 wpm</u>	N = 444	N = 361	N = 46	N = 851
Mean (wpm)	12.11	13.30	9.53	12.48
s.d.	3.40	3.70	3.28	3.64

Table A-4

Middle-of-Year Frequency Distribution
Percent Accuracy - 50 wpm
Gregg Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	12	2.3	2.3
90.01 - 95.00	33	6.2	8.5
85.01 - 90.00	29	5.5	14.0
80.01 - 85.00	48	9.1	23.1
70.01 - 80.00	88	16.6	39.7
60.01 - 70.00	87	16.4	56.1
50.01 - 60.00	89	16.8	72.9
40.01 - 50.00	84	15.9	88.8
0 - 40.00	59	11.2	100.0
Total	529	100.0	100.0

mean 63.63

median 63.53

mode 59.48

range 18.39 - 99.29 (80.90)

coefficient of variation = 28.92%

s.d. 18.40

Table A-5

Middle-of-Year Frequency Distribution
Percent Accuracy - 60 wpm
Gregg Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	6	1.2	1.2
90.01 - 95.00	11	2.2	3.4
85.01 - 90.00	10	2.0	5.4
80.01 - 85.00	13	2.6	8.0
70.01 - 80.00	66	13.0	21.0
60.01 - 70.00	73	14.4	35.4
50.01 - 60.00	90	17.8	53.2
40.01 - 50.00	114	22.5	75.7
0 - 40.00	123	24.3	100.0
Total	506	100.0	100.0

mean 53.47

median 51.52

mode 50.00

range 12.31 - 100 (87.69)

coefficient of variation = 34.02%

s.d. 18.19

Table A-6

Middle-of-Year Frequency Distribution
Percent Accuracy - 70 wpm
Gregg Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 -100.00	1	0.2	0.2
90.01 - 95.00	1	0.2	0.4
85.01 - 90.00	4	0.8	1.2
80.01 - 85.00	4	0.8	2.0
70.01 - 80.00	9	1.8	3.8
60.01 - 70.00	36	7.2	11.0
50.01 - 60.00	89	17.8	28.8
40.01 - 50.00	116	23.2	52.0
0 - 40.00	241	48.1	100.1
Total	468	100.0	100.0

mean 41.727

median 41.170

mode 38.65

range 8.41 - 98.73 (90.32)

coefficient of variation = 36.65%

s.d. 15.29

Table A-7

End-of-Year Frequency Distribution
 Percent Accuracy - 60 wpm
 Gregg Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	218	46.6	46.6
90.01 - 95.00	82	17.5	64.1
85.01 - 90.00	49	10.5	74.6
80.01 - 85.00	32	6.8	81.4
70.01 - 80.00	43	9.2	90.6
60.01 - 70.00	32	6.8	97.4
50.01 - 60.00	9	1.9	99.3
40.01 - 50.00	1	0.2	99.5
0 - 40.00	2	0.4	99.9
Total	468	100.0	100.0

mean 89.56

median 93.73

mode 100.00

range 35.12 - 100.00 (64.88)

coefficient of variation = 12.85%

s.d. 11.51

Table A-8
End-of-Year Frequency Distribution
Percent Accuracy - 70 wpm
Gregg Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	95	20.3	20.3
90.01 - 95.00	62	13.3	33.6
85.01 - 90.00	46	9.9	43.5
80.01 - 85.00	49	10.5	54.0
70.01 - 80.00	68	14.6	68.6
60.01 - 70.00	78	16.7	85.3
50.01 - 60.00	41	8.8	94.1
40.01 - 50.00	23	4.9	99.0
0 - 40.00	5	1.1	100.1
Total	467	100.0	100.0

mean 78.90

median 81.99

mode 100.00

range 29.34 - 100.00 (70.66)

coefficient of variation = 20.82%

s.d. 16.43

Table A-9

End-of-Year Frequency Distribution
 Percent Accuracy - 80 wpm
 Gregg Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	37	8.2	8.2
90.01 - 95.00	29	6.4	14.6
85.01 - 90.00	30	6.6	21.2
80.01 - 85.00	34	7.5	28.9
70.01 - 80.00	74	16.3	45.2
60.01 - 70.00	87	19.2	64.4
50.01 - 60.00	75	16.6	81.0
40.01 - 50.00	56	12.4	93.4
0 - 40.00	31	6.8	100.2
Total	453	100.0	100.0

mean 67.54

median 67.32

mode 45.06

range 22.48 - 100.00 (77.52)

coefficient of variation = 27.24%

s.d. 18.40

Table A-10

Middle-of-Year Frequency Distribution
Percent Accuracy - 50 wpm
Forkner Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	92	18.1	18.1
90.01 - 95.00	86	17.0	35.1
85.01 - 90.00	70	13.8	48.9
80.01 - 85.00	54	10.7	59.6
70.01 - 80.00	65	12.8	72.4
60.01 - 70.00	72	14.2	86.6
50.01 - 60.00	39	7.7	94.3
40.01 - 50.00	20	3.9	98.2
0 - 40.00	9	1.8	100.0
Total	507	100.0	100.0

mean 79.81

median 84.83

mode 99.29

range 12.39 - 100.00 (87.61)

coefficient of variation = 20.25%

s.d. 16.16

Table A-11

Middle-of-Year Frequency Distribution
Percent Accuracy - 60 wpm
Forkner Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 -100.00	44	8.7	8.7
90.01 - 95.00	48	9.5	18.2
85.01 - 90.00	40	8.0	26.2
80.01 - 85.00	36	7.2	33.4
70.01 - 80.00	87	17.3	50.7
60.01 - 70.00	88	17.5	68.2
50.01 - 60.00	69	13.7	81.9
40.01 - 50.00	58	11.5	93.4
0 - 40.00	33	6.6	100.0
Total	503	100.0	100.0

mean 69.57

median 70.49

mode 45.23

range 18.75 - 100.00 (81.25)

coefficient of variation = 26.86%

s.d. 18.69

Table A-12

Middle-of-Year Frequency Distribution
Percent Accuracy - 70 wpm
Forkner Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	5	1.0	1.0
90.01 - 95.00	4	0.8	1.8
85.01 - 90.00	12	2.5	4.3
80.01 - 85.00	21	4.4	8.7
70.01 - 80.00	58	12.1	20.8
60.01 - 70.00	82	17.1	37.9
50.01 - 60.00	103	21.5	59.4
40.01 - 50.00	87	18.2	77.6
0 - 40.00	107	22.3	99.9
Total	479	100.0	100.0

mean 54.73

median 54.93

mode 32.38

range 2.00 - 97.78 (95.78)

coefficient of variation = 31.98

s.d. 17.50

Table A-13

End-of-Year Frequency Distribution
 Percent Accuracy - 60 wpm
 Forkner Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	215	55.4	55.4
90.01 - 95.00	64	16.5	71.9
85.01 - 90.00	43	11.1	83.0
80.01 - 85.00	19	4.9	87.9
70.01 - 80.00	30	7.7	95.6
60.01 - 70.00	10	2.6	98.2
50.01 - 60.00	6	1.5	99.7
40.01 - 50.00	0	0.0	99.7
0 - 40.00	1	0.3	100.0
Total	388	100.0	100.0

mean 91.85

median 95.75

mode 100.00

range 33.68 - 100.00 (66.32)

coefficient of variation = 10.44%

s.d. 9.59

Table A-14
End-of-Year Frequency Distribution
Percent Accuracy - 70 wpm
Forkner Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	97	25.2	25.2
90.01 - 95.00	60	15.6	40.8
85.01 - 90.00	43	11.2	52.0
80.01 - 85.00	41	10.6	62.6
70.01 - 80.00	72	18.7	81.3
60.01 - 70.00	45	11.7	93.0
50.01 - 60.00	18	4.7	97.7
40.01 - 50.00	6	1.6	99.3
0 - 40.00	3	0.8	100.1
Total	385	100.0	100.0

mean 83.04

median 86.19

mode 99.69

range 30.33 - 100.00 (69.67)

coefficient of variation = 17.09%

s.d. 14.19

Table A-15

End-of-Year Frequency Distribution
 Percent Accuracy - 80 wpm
 Forkner Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	24	6.4	6.4
90.01 - 95.00	32	8.5	14.9
85.01 - 90.00	25	6.7	21.6
80.01 - 85.00	34	9.1	30.7
70.01 - 80.00	58	15.5	46.2
60.01 - 70.00	73	19.5	65.7
50.01 - 60.00	66	17.6	83.3
40.01 - 50.00	36	9.6	92.9
0 - 40.00	27	7.2	100.1
Total	375	100.0	100.0

mean 68.20

median 68.14

mode 83.49

range 10.14 - 99.09 (88.95)

coefficient of variation = 26.84%

s.d. 18.30

Table A-16

Middle-of-Year Frequency Distribution
Percent Accuracy - 50 wpm
Century 21 Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	4	7.3	7.3
90.01 - 95.00	6	10.9	18.2
85.01 - 90.00	9	16.4	34.6
80.01 - 85.00	7	12.7	47.3
70.01 - 80.00	10	18.2	65.5
60.01 - 70.00	5	9.1	74.6
50.01 - 60.00	8	14.5	89.1
40.01 - 50.00	4	7.3	96.4
0 - 40.00	2	3.6	100.0
Total	55	100.0	100.0

mean 73.78

median 79.14

mode 14.18

range 14.18 - 98.94 (84.76)

coefficient of variation = 25.05%

s.d. 18.48

Table A-17

Middle-of-Year Frequency Distribution
Percent Accuracy - 60 wpm
Century 21 Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 -100.00	1	1.8	1.8
90.01 - 95.00	5	8.9	10.7
85.01 - 90.00	2	3.6	14.3
80.01 - 85.00	5	8.9	23.2
70.01 - 80.00	9	16.1	39.3
60.01 - 70.00	12	21.4	60.7
50.01 - 60.00	6	10.7	71.4
40.01 - 50.00	7	12.5	83.9
0 - 40.00	9	16.1	100.0
Total	56	100.0	100.0

mean 62.45

median 64.20

mode 12.97

range 12.97 - 95.85 (82.88)

coefficient of variation = 32.58%

s.d. 20.34

Table A-18

Middle-of-Year Frequency Distribution
Percent Accuracy - 70 wpm
Century 21 Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	0	0.0	0.0
90.01 - 95.00	0	0.0	0.0
85.01 - 90.00	1	1.8	1.8
80.01 - 85.00	0	0.0	1.8
70.01 - 80.00	3	5.4	7.2
60.01 - 70.00	10	17.9	25.1
50.01 - 60.00	15	26.8	51.9
40.01 - 50.00	11	19.6	71.5
0 - 40.00	16	28.6	100.1
Total	56	100.0	100.0

mean 49.14

median 50.31

mode 30.56

range 9.10 - 87.09 (77.99)

coefficient of variation = 32.41%

s.d. 15.93

Table A-19
 End-of-Year Frequency Distribution
 Percent Accuracy - 60 wpm
 Century 21 Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	29	56.9	56.9
90.01 - 95.00	5	9.8	66.7
85.01 - 90.00	2	3.9	70.6
80.01 - 85.00	3	5.9	76.5
70.01 - 80.00	3	5.9	82.4
60.01 - 70.00	2	3.9	86.3
50.01 - 60.00	3	5.9	92.2
40.01 - 50.00	1	2.0	94.2
0 - 40.00	3	5.9	100.1
Total	51	100.0	100.0

mean 86.07

median 97.01

mode 98.51

range 23.60 - 100.00 (76.40)

coefficient of variation = 22.83%

s.d. 19.65

Table A-20
End-of-Year Frequency Distribution
Percent Accuracy - 70 wpm
Century 21 Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	11	22.0	22.0
90.01 - 95.00	8	16.0	38.0
85.01 - 90.00	4	8.0	46.0
80.01 - 85.00	4	8.0	54.0
70.01 - 80.00	8	16.0	70.0
60.01 - 70.00	7	14.0	84.0
50.01 - 60.00	1	2.0	86.0
40.01 - 50.00	3	6.0	92.0
0 - 40.00	4	8.0	100.0
Total	50	100.0	100.0

mean 77.29

median 83.11

mode 100.00

range 15.42 - 100.00 (84.58)

coefficient of variation = 27.25%

s.d. 21.06

Table A-21

End-of-Year Frequency Distribution
 Percent Accuracy - 80 wpm
 Century 21 Shorthand

Percent Accuracy Range	No. Students	Percent of Students in Range	Cum. Percent
95.01 - 100.00	3	6.3	6.3
90.01 - 95.00	3	6.3	12.6
85.01 - 90.00	2	4.2	16.8
80.01 - 85.00	3	6.3	23.1
70.01 - 80.00	10	20.8	43.9
60.01 - 70.00	8	16.7	60.6
50.01 - 60.00	9	18.8	79.4
40.01 - 50.00	6	12.5	91.9
0 - 40.00	4	8.3	100.2
Total	48	100.0	100.0

mean 64.79

median 65.94

mode 12.80

range 12.80 - 98.76 (85.96)

coefficient of variation = 32.37%

s.d. 20.98

Appendix G

Table A-22

Middle-of-Year High and Low Scores on Revised Byers' Shorthand Aptitude Test
Means and Standard Deviations on Dictation Tests for
Gregg, Forkner and Century 21 Shorthand Systems
Percent Accuracy at 50, 60 and 70 wpm

Speed of Dictation	Below Median on Byers'				Above Median on Byers'			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>50 wpm</u>								
N	205	232	20	457	265	255	33	553
$\bar{X}$	55.37%	72.84%	60.48%	64.46%	70.19%	86.54%	82.67%	78.47%
s.d.	17.47	16.60	17.89	19.05	17.14	12.39	13.04	16.88
<u>60 wpm</u>								
N	194	229	21	444	253	254	33	540
$\bar{X}$	44.84%	60.31%	47.77%	52.96%	60.76%	78.22%	72.78%	69.71%
s.d.	16.16	16.86	16.60	18.18	17.70	15.86	16.29	18.78
<u>70 wpm</u>								
N	193	219	21	433	250	241	33	524
$\bar{X}$	34.72%	46.29%	39.31%	40.80%	47.64%	62.52%	56.53%	55.05%
s.d.	12.59	14.49	13.54	14.72	15.35	16.31	12.89	17.22

Table A-23

Middle-of-Year High and Low Scores on Revised Byers' Shorthand Aptitude Test
Means and Standard Deviations on Dictation Tests for
Gregg, Forkner and Century 21 Shorthand Systems
Percent English Error at 50, 60 and 70 wpm

Speed of Dictation	Below Median on Byers'				Above Median on Byers'			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>50 wpm</u>								
N	205	232	20	457	265	255	33	553
$\bar{X}$	10.39%	10.27%	14.36%	10.50%	7.45%	6.28%	8.91%	7.00%
s.d.	4.22	4.31	5.93	4.42	3.47	3.00	3.32	3.33
<u>60 wpm</u>								
N	194	229	21	444	253	254	33	540
$\bar{X}$	12.37%	12.02%	15.22%	12.33%	8.57%	8.77%	11.32%	8.83%
s.d.	6.81	4.95	6.23	5.92	3.82	4.22	4.26	4.09
<u>70 wpm</u>								
N	193	218	21	432	250	241	33	524
$\bar{X}$	9.12%	9.00%	14.60%	9.33%	6.66%	6.42%	10.68%	6.80%
s.d.	4.77	4.01	7.47	4.72	3.81	3.09	4.32	3.67

Table A-24

Middle-of-Year High and Low Scores on Revised Byers' Shorthand Aptitude Test
Means and Standard Deviations on Dictation Tests for
Gregg, Forkner and Century 21 Shorthand Systems
Transcription Rate at 50, 60 and 70 wpm

Speed of Dictation	Below Median on Byers'				Above Median on Byers'			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>50 wpm</u>								
N	196	224	20	440	263	244	33	540
$\bar{X}$ -wpm	9.19	11.52	6.97	10.27	11.63	13.48	11.01	12.43
s.d.	3.44	13.06	2.78	9.70	4.19	4.54	3.99	4.44
<u>60 wpm</u>								
N	186	217	20	423	252	244	33	529
$\bar{X}$ -wpm	8.67	10.27	6.28	9.38	11.33	12.49	10.18	11.79
s.d.	3.20	3.73	2.58	3.61	3.50	4.22	3.72	3.92
<u>70 wpm</u>								
N	185	211	20	416	249	237	33	519
$\bar{X}$ -wpm	8.81	10.18	7.14	9.42	11.43	12.02	9.90	11.60
s.d.	3.47	4.03	3.02	3.83	3.72	4.07	3.09	3.88

Table A-25

End-of-Year High and Low Scores on Revised Byers' Shorthand Aptitude Test
Means and Standard Deviations on Dictation Tests for
Gregg, Forkner and Century 21 Shorthand Systems
Percent Accuracy at 60, 70 and 80 wpm

Speed of Dictation	Below Median on Byers'				Above Median on Byers'			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>60 wpm</u>								
N	160	170	19	349	249	205	30	484
$\bar{X}$	83.86%	87.42%	73.81%	85.04%	93.25%	95.54%	94.80%	94.31%
s.d.	13.46	11.35	23.90	13.61	7.97	5.82	9.45	7.31
<u>70 wpm</u>								
N	160	169	19	348	248	203	30	481
$\bar{X}$	71.80%	76.22%	62.08%	73.42%	83.50%	88.71%	86.90%	85.91%
s.d.	16.84	14.63	22.24	16.47	14.62	11.13	13.97	13.43
<u>80 wpm</u>								
N	153	164	18	335	241	198	29	468
$\bar{X}$	59.60%	59.42%	49.62%	58.97%	72.88%	75.60%	74.04%	74.10%
s.d.	17.39	16.54	19.64	17.20	17.24	16.19	16.33	16.76

Table A-26

End-of-Year High and Low Scores on Revised Byers' Shorthand Aptitude Test
Means and Standard Deviations on Dictation Tests for
Gregg, Forkner and Century 21 Shorthand Systems
Percent English Error at 60, 70 and 80 wpm

Speed of Dictation	Below Median on Byers'				Above Median on Byers'			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>60 wpm</u>								
N	160	170	19	349	249	205	30	484
$\bar{X}$	5.80%	6.48%	4.80%	6.07%	3.83%	4.07%	2.96%	3.88%
s.d.	3.28	3.12	2.37	3.19	2.17	2.55	1.45	2.31
<u>70 wpm</u>								
N	160	169	19	348	248	203	30	481
$\bar{X}$	7.33%	7.93%	7.19%	7.61%	5.04%	5.45%	4.98%	5.21%
s.d.	3.69	3.61	4.49	3.70	2.56	3.23	2.35	2.85
<u>80 wpm</u>								
N	153	164	18	335	241	198	29	468
$\bar{X}$	9.77%	9.69%	9.18%	9.70%	6.71%	7.26%	6.38%	6.93%
s.d.	4.44	3.99	3.95	4.19	3.20	3.72	3.52	3.45

Table A-27

End-of-Year High and Low Scores on Revised Byers' Shorthand Aptitude Test
Means and Standard Deviations on Dictation Tests for
Gregg, Forkner and Century 21 Shorthand Systems
Transcription Rate at 60, 70 and 80 wpm

Speed of Dictation	Below Median on Byers'				Above Median on Byers'			
	Gregg	Forkner	Century 21	All	Gregg	Forkner	Century 21	All
<u>60 wpm</u>								
N	152	164	19	335	242	203	30	475
$\bar{X}$ -wpm	12.67	13.55	8.03	12.84	16.12	17.04	12.68	16.30
s.d.	3.62	4.30	3.19	4.13	4.69	5.12	4.87	4.99
<u>70 wpm</u>								
N	151	162	19	332	241	201	30	472
$\bar{X}$ -wpm	11.88	13.10	8.70	12.29	14.48	16.12	12.31	15.04
s.d.	3.20	3.71	3.24	3.61	3.68	4.23	4.58	4.11
<u>80 wpm</u>								
N	147	156	18	321	238	195	27	460
$\bar{X}$ -wpm	10.64	11.96	7.85	11.13	13.09	14.43	10.72	13.52
s.d.	2.69	3.30	2.94	3.18	3.45	3.61	3.06	3.62

Table A-28

Middle-of-Year Summary of Two-Way Analysis of Variance
 Shorthand Dictation Scores by Shorthand System
 by High and Low Byers' Aptitude Test Scores

Scores Compared	Main Effects				Interaction	
	System		High-Low Score Status		System x Score Status	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>						
50 wpm	134.519	0.001	211.461	0.001	1.623	0.196
60 wpm	114.461	0.001	264.325	0.001	1.824	0.160
70 wpm	92.362	0.001	235.925	0.001	1.586	0.203
<u>Percent English Error</u>						
50 wpm	17.693	0.001	222.295	0.001	3.906	0.020
60 wpm	8.113	0.001	123.196	0.001	0.391	0.999
70 wpm	34.601	0.001	98.020	0.001	0.748	0.999
<u>Transcription Rate</u>						
50 wpm	12.007	0.001	24.395	0.001	0.511	0.999
60 wpm	25.005	0.001	108.663	0.001	1.306	0.270
70 wpm	13.794	0.001	80.436	0.001	1.257	0.284

Table A-29

End-of-Year Summary of Two-Way Analysis of Variance
 Shorthand Dictation Scores by Shorthand System
 by High and Low Byers' Aptitude Test Scores

Scores Compared	Main Effects				Interaction	
	System		High-Low Score Status		System x Score Status	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>						
60 wpm	11.823	0.001	174.175	0.001	8.224	0.001
70 wpm	12.919	0.001	156.825	0.001	4.290	0.014
80 wpm	1.917	0.146	158.465	0.001	2.413	0.088
<u>Percent English Error</u>						
60 wpm	6.473	0.002	130.235	0.001	0.727	0.999
70 wpm	2.489	0.082	108.154	0.001	0.090	0.999
80 wpm	1.046	0.353	102.891	0.001	0.625	0.999
<u>Transcription Rate</u>						
60 wpm	24.974	0.001	119.863	0.001	0.375	0.999
70 wpm	31.427	0.001	111.072	0.001	0.535	0.999
80 wpm	34.189	0.001	105.793	0.001	0.078	0.999

Appendix H

Table A-30

Middle-of-Year Summary of Analysis of Covariance
 Shorthand Achievement Scores by System
 with Byers' Total Score as Covariate
 50, 60 and 70 wpm

Scores Compared	Main Effect of System	
	F Ratio	F Prob
<u>Percent Accuracy</u>		
50 wpm	144.791	0.001
60 wpm	125.252	0.001
70 wpm	105.390	0.001
<u>Percent English Error</u>		
50 wpm	15.380	0.001
60 wpm	6.730	0.002
70 wpm	32.721	0.001
<u>Transcription Rate</u>		
50 wpm	11.601	0.001
60 wpm	23.634	0.001
70 wpm	12.374	0.001

Table A-31

End-of-Year Summary of Analysis of Covariance
 Shorthand Achievement Scores by System
 with Byers' Total Score as Covariate
 60, 70 and 80 wpm

Scores Compared	Main Effect of System	
	F Ratio	F Prob
<u>Percent Accuracy</u>		
60 wpm	11.206	0.001
70 wpm	13.545	0.001
80 wpm	1.307	0.270
<u>Percent English Error</u>		
60 wpm	8.601	0.001
70 wpm	3.009	0.048
80 wpm	1.786	0.166
<u>Transcription Rate</u>		
60 wpm	23.780	0.001
70 wpm	31.127	0.001
80 wpm	33.236	0.001

Table A-32

Middle-of-Year Summary of Two-Way Analysis of Covariance
 Shorthand Achievement Scores by Systems and
 by Transcript Type (Longhand or Typewritten)
 with Byers' Total Score as Covariate, at 50, 60 and 70 wpm

Scores Compared	Main Effects				Interaction	
	System		Transcript		System x Transcript	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>						
50 wpm	113.643	0.001	0.055	0.999	0.000	0.999
60 wpm	119.245	0.001	2.856	0.087	0.064	0.999
70 wpm	104.409	0.001	5.270	0.021	0.383	0.999
<u>Percent English Error</u>						
50 wpm	10.358	0.001	0.951	0.999	5.627	0.017
60 wpm	5.835	0.003	0.114	0.999	30.699	0.001
70 wpm	32.696	0.001	1.928	0.162	9.421	0.003
<u>Transcription Rate</u>						
50 wpm	10.910	0.001	0.448	0.999	21.300	0.001
60 wpm	24.649	0.001	3.281	0.067	30.655	0.001
70 wpm	20.121	0.001	14.918	0.001	42.120	0.001

Table A-33

End-of-Year Summary of Two-Way Analysis of Covariance
 Shorthand Achievement Scores by Systems and
 by Transcript Type (Longhand or Typewritten)
 with Byers' Total Score as Covariate, at 60, 70 and 80 wpm

Scores Compared	Main Effects				Interaction	
	System		Transcript		System x Transcript	
	F Ratio	F Prob	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>						
60 wpm	13.139	0.001	2.934	0.083	34.245	0.001
70 wpm	20.870	0.001	18.382	0.001	17.894	0.001
80 wpm	5.018	0.007	20.514	0.001	3.747	0.050
<u>Percent English Error</u>						
60 wpm	5.256	0.006	4.383	0.034	2.732	0.095
70 wpm	1.276	0.279	3.848	0.047	6.583	0.010
80 wpm	1.266	0.282	0.332	0.999	0.395	0.999
<u>Transcription Rate</u>						
60 wpm	18.676	0.001	2.053	0.148	2.058	0.148
70 wpm	28.210	0.001	0.172	0.999	2.077	0.146
80 wpm	28.705	0.001	0.007	0.999	1.780	0.179

Table A-34

Middle-of-Year Summary of Analysis of Covariance
 Shorthand Achievement Scores by System
 within Longhand or Typewritten Transcripts
 with Byers' Total Score as Covariate, at 50, 60 and 70 wpm

Scores Compared	Longhand Transcript		Typewritten Transcript*	
	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>				
50 wpm	37.001	0.001	183.457	0.001
60 wpm	32.526	0.001	169.493	0.001
70 wpm	28.846	0.001	149.564	0.001
<u>Percent English Error</u>				
50 wpm	7.977	0.001	9.859	0.001
60 wpm	22.167	0.001	7.262	0.007
70 wpm	33.411	0.001	6.333	0.012
<u>Transcription Rate</u>				
50 wpm	11.850	0.001	26.421	0.001
60 wpm	12.164	0.001	53.696	0.001
70 wpm	14.294	0.001	53.395	0.001

* Includes Gregg and Forkner shorthand only.

Table A-35

End-of-Year Summary of Analysis of Covariance
 Shorthand Achievement Scores by System
 within Longhand or Typewritten Transcripts
 with Byers' Total Score as Covariate, at 60, 70 and 80 wpm

Scores Compared	Longhand Transcript*		Typewritten Transcript	
	F Ratio	F Prob	F Ratio	F Prob
<u>Percent Accuracy</u>				
60 wpm	18.142	0.001	15.091	0.001
70 wpm	12.141	0.001	22.510	0.001
80 wpm	3.952	0.047	4.401	0.013
<u>Percent English Error</u>				
60 wpm	0.002	0.999	6.175	0.003
70 wpm	3.854	0.050	2.900	0.054
80 wpm	0.049	0.999	1.396	0.247
<u>Transcription Rate</u>				
60 wpm	26.294	0.001	10.575	0.001
70 wpm	18.407	0.001	22.024	0.001
80 wpm	20.537	0.001	21.579	0.001

* Includes Gregg and Century 21 shorthand only.

Table A-36

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement No. 1: "I Think Shorthand is Easy to Learn"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	0.55	28.72	28.72	30.85	11.35
MOY	451	4.43	46.12	18.18	24.61	6.65
EOY	391	11.00	52.94	12.28	18.41	5.37
<u>Forkner</u>						
BOY	576	3.65	48.26	31.60	14.24	2.26
MOY	489	9.61	53.78	13.09	18.61	4.91
EOY	353	15.30	62.04	11.05	9.92	1.70
<u>Century 21</u>						
BOY	72	8.33	52.78	26.39	11.11	1.39
MOY	54	24.07	46.30	14.81	14.81	0
EOY	50	26.00	52.00	6.00	16.00	0

Table A-37

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 2: "I Think Shorthand Requires Lots of Effort and Practice"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	56.21	38.83	3.55	0.89	0.53
MOY	451	62.08	34.59	2.66	0.67	0
EOY	391	60.87	33.25	2.56	2.56	0.77
<u>Forkner</u>						
BOY	576	38.02	50.03	6.94	4.69	0
MOY	489	47.44	42.54	5.93	3.68	0.41
EOY	353	49.29	39.38	5.95	5.38	0
<u>Century 21</u>						
BOY	72	50.00	47.22	1.39	1.39	0
MOY	54	51.85	44.44	1.85	1.85	0
EOY	50	48.00	46.00	4.00	2.00	0

Table A-38

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 3: "I Think Learning Shorthand Can Be Fun"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	9.75	56.38	28.37	4.26	1.24
MOY	451	9.09	50.33	29.71	9.53	1.33
EOY	391	15.60	45.78	31.20	6.39	1.02
<u>Forkner</u>						
BOY	576	11.81	58.51	25.17	4.34	0.17
MOY	489	8.38	44.38	31.08	13.09	3.07
EOY	353	10.76	49.86	27.76	8.78	2.83
<u>Century 21</u>						
BOY	72	15.28	69.44	11.11	4.17	0
MOY	54	24.07	48.15	22.22	5.56	0
EOY	50	16.00	44.00	30.00	4.00	6.00

Table A-39

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 4: "I Plan to Use My Shorthand Skill
 As an Office Employee After High School Graduation"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	18.62	28.55	45.39	6.21	1.24
MOY	451	12.20	22.62	49.67	11.53	4.00
EOY	391	15.35	23.53	43.73	12.28	5.12
<u>Forkner</u>						
BOY	576	11.63	24.31	45.49	12.50	6.08
MOY	489	8.59	17.38	45.40	18.20	10.43
EOY	353	14.73	22.10	41.93	12.75	8.50
<u>Century 21</u>						
BOY	72	22.22	30.56	38.89	8.33	0
MOY	54	18.52	22.22	46.30	11.11	1.85
EOY	50	12.00	14.00	56.00	12.00	6.00

Table A-40

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 5: "I Plan to Continue My Education After High School"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	25.89	26.42	38.83	6.38	2.48
MOY	451	27.27	27.94	36.59	5.32	2.88
EOY	391	36.32	26.09	30.18	5.88	1.53
<u>Forkner</u>						
BOY	576	32.47	26.04	33.51	5.56	2.43
MOY	489	34.56	25.77	30.06	6.54	3.07
EOY	353	39.09	25.50	27.20	5.95	2.25
<u>Century 21</u>						
BOY	72	34.72	26.39	31.94	4.17	2.78
MOY	54	48.15	12.96	25.93	5.56	7.41
EOY	50	40.00	22.00	30.00	4.00	4.00

Table A-41

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 6: "I Plan to Get an Office Job After High School Graduation"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	12.94	23.76	51.24	10.28	1.77
MOY	451	9.98	21.95	51.00	11.97	5.10
EOY	391	14.32	23.27	41.94	15.09	5.37
<u>Forkner</u>						
BOY	576	7.99	17.53	51.56	15.10	7.81
MOY	489	6.95	18.81	44.79	19.63	9.82
EOY	353	16.43	21.53	40.79	12.46	8.78
<u>Century 21</u>						
BOY	72	13.89	18.06	55.56	11.11	1.39
MOY	54	12.96	20.37	50.00	7.41	9.26
EOY	50	18.00	16.00	38.00	16.00	12.00

Table A-42

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 7: "I Believe that I Can Succeed in Learning Shorthand"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	15.78	69.20	14.18	2.30	0.53
MOY	451	15.52	61.86	17.07	3.77	1.77
EOY	391	22.25	56.52	16.11	3.58	1.53
<u>Forkner</u>						
BOY	576	17.01	67.53	14.41	0.69	0.35
MOY	489	16.56	55.21	18.40	6.75	3.07
EOY	353	21.53	58.07	14.45	3.40	2.55
<u>Century 21</u>						
BOY	72	26.39	59.72	13.89	0	0
MOY	54	42.59	40.74	16.67	0	0
EOY	50	26.00	58.00	10.00	6.00	0

Table A-43

Attitude Inventory
 Gregg, Forkner and Century 21 Shorthand Students
 Statement 8: "I Am Interested in Learning Shorthand"

System and Testing Time	N	Percent Giving Response				
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
<u>Gregg</u>						
BOY	564	28.37	61.17	8.16	1.77	0.53
MOY	451	19.07	60.01	13.75	4.43	2.66
EOY	391	20.46	57.29	15.09	4.09	3.07
<u>Forkner</u>						
BOY	576	23.44	68.92	6.77	0.69	0.17
MOY	489	14.11	56.85	17.38	8.18	3.48
EOY	353	17.85	54.67	17.56	7.08	2.83
<u>Century 21</u>						
BOY	72	38.89	56.94	4.17	0	0
MOY	54	35.19	50.00	14.81	0	0
EOY	50	24.00	50.00	18.00	6.00	2.00